

BULLETIN OF MISCELLANEOUS INFORMATION No. 2 1934 ROYAL BOTANIC GARDENS, KEW

IV—SPECIMENS COLLECTED BY BRADBURY IN MISSOURI TERRITORY.

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John Bradbury travelled and collected for the Liverpool Botanic Garden* in the western parts of North America during 1810 and 1811. In 1817 he published his "Travels in the Interior of America,"† in which are included his observations on the country, on its inhabitants, and on its natural history. His botanical notes in particular are of interest in connection with certain of his specimens preserved in the Herbarium of the Royal Botanic Gardens, Kew.

Bradbury made his headquarters in St. Louis, and during the spring and summer of 1810 made "frequent excursions alone into the wilderness, but not farther than eighty or a hundred miles into the interior." The summer of 1811 was occupied by a journey up the Missouri river as far as the Mandans, of which a detailed journal is found in the "Travels."‡ On pp. 335-338 appears a "catalogue of some of the more rare or valuable plants discovered in the neighbourhood of St. Louis and on the Missouri," in which are notices of many species gathered on the Meramec river or at other points near St. Louis during 1810, and in the Missouri valley during 1811. When he returned to England, he found that his collections had been "submitted to the inspection of a person of the name of Pursh, who has published the most interesting of my plants in an appendix to the *Flora Americae Septentrionalis*." Nuttall also was of the party which ascended the Missouri, and many of his species were undoubtedly founded on collections made at the same time as those of Bradbury.

In spite of the vast area traversed and its wild state, it is possible to identify rather exactly most of the place-names which appear in Bradbury's catalogue of plants and on the specimens themselves. In the brief outline of his journal which follows are included the

* See Britten and Boulger, *Biogr. Ind.* ed. 2, 42 (1931); Hall, *Naturalist*, 4, 397 (1839); True, *Proc. Am. Phil. Soc.* 68, 133-150 (1929).

† A second edition appeared in 1819, with the addition of a map. This edition is reprinted, with notes, in Thwaites, *Early Western Travels*, 5 (1904).

‡ He accompanied the Astorian expedition led by Hunt.

modern names for the places which he visited, besides various observations of more general interest.*

March 13. "Left St. Louis at two o'clock the following morning, in company with a young Englishman of the name of Nuttall." Arrived at St. Charles [Mo. This part of the journey was made overland. Most of the party had preceded them and wintered up the river].

March 14. Embarked on the Missouri river,† "the Canadians measuring the strokes of their oars by songs." [One of the songs appears in a footnote, p. 12.]

March 17. Met with "Daniel Boond, the discoverer of Kentucky," then aged 84.

March 18. Camped on Lutre island [perhaps near the present town of Hermann, near the mouth of the Loutre river]. The bluffs were adorned with *Anemone Hepatica* [*Hepatica acutiloba* DC.].

March 20. Passed the mouth of the Gasconade river. The bluffs were crowned with cedar [*Juniperus virginiana* L.], while on the ledges appeared *Mespilus canadensis* [*Amelanchier canadensis* (L.) Medic.] in full flower.

March 21. Accompanied the boats by land. On this occasion he "was surprised to find that Mr. Nuttall could not swim." This cost them several miles of difficult walking. This is the only mention of any trip in Nuttall's company, and, since Bradbury takes pains to mention his other companions on his numerous collecting excursions, it is evident that relations were none too cordial between the two botanists.‡ From occasional mention,

* The map in the 2nd edition of the "Travels" is not very helpful, since it does not illustrate all the places mentioned. The best contemporary map is the Arrowsmith map of 1814, to be seen in Paullin, *Atl. Hist. Geog. U. S.* (1932). A map which illustrates all the early explorations in the Missouri valley is included in Chittenden, *American Fur Trade* (1902). Many notes on specific places are found in this work, also in Thwaites' edition of Bradbury's "Travels." Brackenridge, with Lisa, overtook the party on June 3, and returned with Bradbury; his narrative of the journey is found in his "Views of Louisiana" (1814), and, reprinted, in his "Journal of a Voyage up the Missouri" (1816); to this is appended a table of distances and latitudes which he says he took from Clark (the data, when compared with modern maps, prove to be accurate in respect of easily identifiable points). The journey is graphically described in Irving's "Astoria" (chapters xiv to xxii), who evidently used Bradbury as his main source.

† Harshberger (*Bot. Philad.* 153: 1899) apparently thought that Bradbury and Nuttall ascended the Missouri on foot. He was mistaken also in the date of departure, in the time of Bradbury's return, and in his nationality. Powers (*Sci., N. S.* 62, 391: 1925) also errs in the date of embarkation.

‡ From the manner in which he refers to Pursh, and from his statement to Baldwin (quoted below), as well as from his coolness toward Nuttall, it might be inferred that Bradbury was jealous of other botanists. His tone toward Pursh, however, may have been warranted; Nuttall himself had similar complaints (*Gen.* 1, 298; 2, 92). His attitude to Nuttall, moreover, may be explained by the eccentricity of the latter—an absorption in botanical collecting which frequently endangered his own safety, besides delaying the party, and which had earned him among the Canadians the nickname of "le fou." This characterization is due to Brackenridge (*Views of Louisiana*, 239), who testifies also to Bradbury's personal charm; he accompanied him on many of his collecting trips.

however, we learn that Nuttall was with the party during the entire ascent.

March 22. Passed the mouth of the Osage river.

March 27. Arrived at the Manitou rocks [near the present village of Rocheport, Mo. Brackenridge wrote of them as on the south bank of the river and somewhat lower. Bradbury's description, however, is more consistent with the north bank. There may, of course, have been several places so designated]. Near here began "Boond's Lick Settlements," the last permanent habitations of white men on the river.

April 2. Passed La Grande Rivière, and saw the first true prairie. [Bradbury, however, uses the term prairie also for isolated treeless and level areas near St. Louis.]

April 8. Arrived at Fort Osage [near the present Sibley, Mo.].

April 10. Left Fort Osage.

April 17. Joined the rest of the party at the Naduet river [the modern Nodoway, which enters the Missouri near St. Joseph, Mo.].

April 21. Re-embarked.

April 28. Arrived at the Platte river [Neb.]. Since no ash grew farther north than this point, a halt was made to replenish the supply of oars.

May 2. Left on an overland trip to the Otto village, up the Platte, arriving the next day.

May 7. Left the Otto village, crossing the Corne du Cerf [Elkhorn] river and following Blackbird creek toward the Missouri.

May 11. Arrived at the Maha village on the Missouri [some 80 miles north of the present city of Omaha, Neb.; see Morris in Bull. Torr. Bot. Club **36**, 519 (1909)]. Near this place Blackbird creek entered the river and the "monument" to Blackbird, a pile of stones on a high bluff, was situated. [This is presumably the Sepulchre Bluffs of the catalogue and specimens. It is described by all the early travellers, and illustrated in Catlin, Ill. N. Amer. Ind. **2**, pl. 117 (1876).]

May 15. Left the Maha village. Passed Floyd's bluffs [near the present Sioux City, Ia.].

May 23. Encountered a party of Poncar Indians.

May 24. Arrived at L'Eau qui Court, or Rapid River [often referred to as the Quicurre; now the Niobrara].

May 27. Camped on Little Cedar Island [near the present Chamberlain, S. D.].

June 1. Arrived at Grand Detour, or Big Bend.

June 8. Passed the mouth of the Cheyenne river. [This is variously spelled Chien, Chienne and Chayenne in the Travels; and Shian on one of the specimens.]

June 12. Arrived at the Aricara village [also known as the Arikaree, Rickaree, etc. This was just north of the Grand river

and about opposite the present Campbell, S. D., very near the northern boundary of the state].*

June 19. Left overland for the fort of the Missouri Fur Company.

June 20. Crossed the Cannonball river.

June 21. Crossed the Rivière de Coeur [Heart river ; the site of the present Mandan, N. D.].

June 22. Reached the Mandan village. Crossed Knife river and passed the lowest of the Minetaree villages. Arrived at the fort, about 140 miles from Cannonball river, and 40 miles above the Mandan village.†

June 25. The boats arrived at the fort.

July 6. Embarked at Fort Mandan for the return trip.

August [day not given]. Arrived at St. Louis. [Bradbury's collections were made during the ascent ; he complains (Travels, vi) that Lisa, in whose boats he returned, had given orders that no stops be made on the return. Since they were travelling with a valuable load of skins, the necessity for such procedure is obvious.]

Several of Bradbury's observations are of interest in the history of the vegetation of the Middle West. He comments on the abundance of *Equisetum hyemale* on the banks and flats of the lower Missouri. This was eaten by the horses of the settlers, and, after three winters of such treatment, usually failed to reappear. (The animals then, through the indolence and improvidence of the natives, were reduced to subsisting miserably on the bark of trees.) At present, species of *Equisetum* (largely *E. robustum* A. Br.) are more or less abundant on the steep banks, and the flats are occupied by willows (see Amer. Midl. Nat. **12**, 414 : 1931). Bradbury collected *Cheilanthes dealbata* (*Notholaena dealbata* Kuntze) on the Manitou rocks. This fern, which is rare in central Missouri, was found at or near the same point by Daniels in 1904 (Univ. Mo. Stud., Sci. ser. **1**, pt. 2, 222 : 1907), and by recent collectors ; it is recorded as " not uncommon " in Jackson County by Mackenzie and Bush (Fl. Jackson Co., **5** : 1902). *Batschia longiflora* (*Lithospermum incisum* Lehm.) is described as extending northward up the Missouri from the mouth of the Platte in Nebraska ; it is now abundant along the river (not in the interior) through Missouri (Univ. Mo. Stud. **6**, pt. 1, 62 : 1931).

* Bradbury mentions passing the Cer-wer-cer-na (Sa-wa-carna of some of the old maps ; now the Moreau), and the Ma-ra-pa (or Maripa ; now Owl creek), apparently confusing the latter with its larger neighbour, the We-tar-hoo (or Waterhoo, now the Grand) ; these two enter the Missouri very close together (and may, of course, have had a common mouth). Brackenridge locates the village as 8 miles above the We-tar-hoo. Irving mistakenly places it between 46° and 47° N. A painting of it appears in Catlin, l.c. **1**, pl. 80.

† This is the fort often known as Fort Lisa. Another post, Fort Mandan, was on the north side of the river and below the Knife ; this had been the winter quarters of Lewis and Clark.

A long footnote (pp. 159–160) is devoted to a description of the bois d'arc, bois jaune, yellow wood, or Osage orange, later described and named by Nuttall (*Maclura aurantiaca* Nutt. Gen. 2, 233 : 1818). Nuttall credits Bradbury also with having first noticed his species *Bumelia oblongifolia* and *Cacalia tuberosa* (l.c., 1, 135 ; 2, 138).

An interesting item is a description of the contents of an Indian medicine bag (p. 116) ; “ that ingredient which was in the greatest abundance was a species of wall-flower.” This he mentions in his catalogue (p. 337) as a “ connecting link between *Erysimum* and *Cheiranthus*, used as medicine by the Aricaras.” It was particularly interesting, therefore, to discover Bradbury's specimen of *Erysimum asperum* DC. in the herbarium at Kew. Hooker (Fl. Bor.-Am. 1, 64 : 1830) quotes Torrey as saying that “ the plant is very bitter, particularly the root, and is used as a medicine by the Indians of the Platte.”

Bradbury returned to St. Louis in 1817 or 1818. In 1819 Baldwin received a visit from the “ venerable Mr. Bradbury ”* (he was then 51), in the course of which the latter observed that “ Lambert had pirated from him his former collections ” (Darlington, Reliq. Baldwin, 316 : 1843).

Of the plants which Bradbury collected, some are now in the herbarium of the Philadelphia Academy of Natural Sciences (see below under *Penstemon*, *Plantago*). These may have been carried there by Nuttall, who spent several years in Philadelphia after his return from the west, and who seems to have acquired some of Bradbury's plants (see, for instance, his references to Bradbury cited above). The rest were sent to Liverpool ; in 1839 there were “ a great many of his dried specimens in the Herbarium, principally in Louisiana ” (Hall, Naturalist, 4, 397 : 1839). These cannot now be found. They did not include the specimens now at Kew, since these came into W. J. Hooker's hands, through Dr. Taylor,† before 1829 (see below under *Myagrurum*).

Of the specimens enumerated below, fourteen represent species named by Pursh (Fl. Amer. Sept. 2, Supplement) from Bradbury's collections. It is improbable that they are the actual specimens seen by Pursh, who states (l.c. 1, xvii) that he obtained Bradbury's plants from Roscoe, who founded the Liverpool Botanic Garden (Hall, l.c., 395 ; Britten and Boulger, l.c., 261).‡ They may be regarded as isotypes.|| This is the more likely since one specimen is a species

* Brackenridge refers to Bradbury, in speaking of their physical hardships endured together, as “ poor old man.” Bradbury amusingly repeats almost verbatim the same expressions of concern, substituting “ poor young man.” He evidently appeared older than he was.

† Thomas Taylor, M.D., a resident of the south of Ireland, correspondent of Hooker and his collaborator in the *Muscologia Britannica* (1818) ; see Britten and Boulger, l.c., 297.

‡ If Bradbury's remark to Baldwin is to be trusted, Pursh may have found some of his specimens in Lambert's collection.

|| The term isotype denotes a duplicate of the type not seen by the original describer (Torreya 19, 13 : 1919).

unknown to Pursh (*Penstemon gracilis* Nutt.). The four remaining specimens are species named by Pursh before he saw Bradbury's plants (one from a collection by Lewis previous to Bradbury's journey; the others probably from Nuttall's specimens).

My attention was directed to these specimens by Dr. T. A. Sprague, who generously placed at my disposal his notes on Bradbury's itinerary and on the synonymy of the species represented. The present study has been made possible by the courtesy of the staff of the Kew herbarium; and by a leave of absence granted by the University of Missouri.

1. *Aristida pallens* Pursh, Fl. Am. Sept. 2, 728 (1814); Bradbury, Travels, 335 (1817); Nutt. Gen. 1, 57 (1818); non Cav. Icon. 5, 43 (1799).

Aristida longiseta Steud., Syn. Pl. Glum. 1, 420 (1854); Rydb. Fl. Prairies & Plains, 83 (1932).

NORTH DAKOTA. In depressed situations near Fort Mandan on the Missouri (ex Nutt.); Mandan country, *Bradbury* (Taylor 11 in Herb. Hook.).

MISSOURI. Hills on the Merrimac (ex Bradbury).

Hitchcock (Contr. U. S. Nat. Herb. 22, 586: 1924) conjectured the identity of *A. pallens* Pursh with *A. longiseta* Steud. Examination of Bradbury's specimen confirms this. The type collection of *A. longiseta* Steud. came from Mexico. Rydberg (l.c.) gave its range as from Minnesota to Illinois, Mexico and Washington.

2. *Stipa membranacea* Pursh, Fl. Am. Sept. 2, 728 (1814); Bradbury, Travels, 335 (1817); non L. Sp. Pl., 560 (1753).

Stipa hymenoides R. & S. Syst. 2, 339, (1817).

Eriocoma cuspidata Nutt. Gen. 1, 40 (1818).

Oryzopsis cuspidata (Nutt.) Benth. ex Vasey, Descr. Cat. Grasses U.S., 37 (1885).

Oryzopsis hymenoides (R. & S.) Ricker ex Piper in Contr. U. S. Nat. Herb. 11, 109 (1906).

Eriocoma hymenoides (R. & S.) Rydb. in Bull. Torr. Bot. Club 39, 102 (1912); Fl. Prairies & Plains, 86 (1932).

NORTH DAKOTA. Fort Mandan (ex Bradbury); prairies, Mandan, *Bradbury* (Taylor 12 in Herb. Hook.); on the grassy plains of the Missouri, from the Arikaree village to the Northern Andes? (ex Nutt.).

"I possess some of Mr. Bradbury's original specimens from the Missouri of this exceedingly beautiful grass, given me by Dr. Taylor." (Hook., Fl. Bor.-Am. 2, 237: 1839). "Probably not a *Stipa*" (Bradbury, l.c.). There seem to be insufficient grounds for separating this species from *Oryzopsis*.

3. *Allionia hirsuta* Pursh, Fl. Am. Sept. 2, 728 (1814); Bradbury, Travels, 335 (1817); Standley in N. Am. Fl. 21, 223 (1918); Rydb. Fl. Prairies & Plains, 309 (1932).

Calymenia hirsuta Nutt. Gen. 1, 26 (1818).

Calymenia pilosa Nutt. l.c. (teste Standley).

Oxybaphus hirsutus (Pursh) Sweet, Hort. Brit. ed. 1, 334 (1826).

SOUTH DAKOTA. Bluffs near the Aricara village (ex Bradbury); near the Missouri,—around the Arikaree village, &c. (*C. pilosa*, ex Nutt.); le haut Missouri, *Bradbury* (Taylor 35 in Herb. Hook.).

Standley unites *C. pilosa* Nutt. with *C. hirsuta*; but Nuttall proposed *C. pilosa* as a new name for *Allionia ovata* Pursh (*A. nyctaginea* Michx. var. *ovata* Morong), a nearly glabrous species. Rydberg maintained three species under these names. *Allionia* L. emend. Choisy is conserved against *Wedelia* Loeffl. Hence *Allionia* Loeffl. becomes *Oxybaphus* L'Hérit.

"Bradbury (from whom there is an authentic specimen in my herbarium) discovered this plant in Upper Louisiana." (Hook., Fl. Bor.-Am. 2, 124; 1838.)

4. *Ranunculus multifidus* Pursh, Fl. Am. Sept. 2, 736 (1814); Bradbury, Travels, 337 (1817); non Forssk. Fl. Aegypt.-Arab., 102 (1775).

Ranunculus delphinifolius Torr. in Eaton, Man. ed. 2, 395 (1818); Rydb. Fl. Prairies & Plains, 342 (1932).

NEBRASKA. In stagnant pools near the Sepulchre Bluffs (ex Bradbury); Otto Nation, *Bradbury* (Taylor 40 in Herb. Hook.).

5. *Myagrurn argenteum* Pursh, Fl. Am. Sept. 2, 434 (1814); Bradbury, Travels, 337 (1817).

Alyssum ludovicianum Nutt. Gen. 2, 63 (1818).

Vesicaria ludoviciana (Nutt.) DC. Prod. 1, 159 (1824).

Lesquerella ludoviciana (Nutt.) Watson in Proc. Amer. Acad. 23, 252 (1888); Rydb. Fl. Prairies & Plains, 363 (1932).

Lesquerella argentea (Pursh) MacM., Metasp. Minn. Valley, 263 (1892); non Watson, l.c.

SOUTH DAKOTA. On limestone rocks, Missouri (ex Bradbury); on the high hills of the Missouri, and on the shelvings of rocks (ex Nutt.); 1100 up the Missouri, *Bradbury* (Taylor 18 in Herb. Hook.).

According to Brackenridge, Big Bend was about 1100 miles from the mouth of the Missouri. "1100 up the Missouri" would therefore be in South Dakota.

Hooker mentions "my specimens gathered by Bradbury on the hills of the Missouri" (Fl. Bor.-Am. 1, 48: 1829).

6. *Erysimum lanceolatum* Pursh, Fl. Am. Sept. 2, 436 (1814); Bradbury, Travels, 337 (1817); non R. Br. in Ait. Hort. Kew., ed. 2, 4, 116 (1812).

Cheiranthus erysimoides Bradbury, Travels, 116, 337 (1817); non L. Sp. Pl., 661 (1753).

Cheiranthus asper Nutt. Gen. 2, 436 (1818).

Erysimum asperum (Nutt.) DC. Syst. 2, 505 (1821).

Cheirinia aspera (Nutt.) Rydb. in Bull. Torr. Bot. Club **39**, 324 (1912) ; Fl. Prairies & Plains, 371 (1932).

SOUTH DAKOTA. On the plains of the Missouri, commencing near the confluence of White river (ex Nutt.) ; 1100 miles up the Missouri, *Bradbury* (Taylor 33 in Herb. Hook.).

Of this species Hooker says : " It seems to have been originally detected by Mr. Bradbury on the banks of the Missouri, at a distance of 1100 miles from its mouth.—I possess that traveller's original specimen, named by Mr. Nuttall " (Fl. Bor.-Am. **1**, 64 : 1830).

For Bradbury's location, see above under *Myagrum*.

Erysimum officinale L. is usually united with *Sisymbrium* ; the name *Erysimum* may then be used for that part of the Linnaean genus to which the present species is related.

7. *Geum triflorum* Pursh, Fl. Am. Sept. **2**, 736 (1814) ; Bradbury, Travels, 336 (1817) ; Nutt. Gen. **1**, 309 (1818).

Sieversia triflora (Pursh) R. Br. ex Richardson, Bot. App. Frankl. Journ., ed. **2**, 21 (1823) ; Rydb. in N. Am. Fl. **22**, 409 (1913) ; Fl. Prairies & Plains, 424 (1932).

Erythrocoma triflora (Pursh) Greene, Leaf. **1**, 175 (1906).

NORTH DAKOTA. Around Fort Mandan on the Missouri (ex Nutt.).

NEBRASKA. Headwaters of Blackbird creek (ex Bradbury) ; prairies, *Bradbury* (Taylor 21 in Herb. Hook.).

The type location is given by Rydberg as " Upper Louisiana (South Dakota)." Hooker (Fl. Bor.-Am. **1**, 176 : 1834) says : " The numerous specimens of this plant precisely accord with Mr. Bradbury's original ones in my Herbarium."

8. *Elaeagnus argentea* Pursh, Fl. Am. Sept. **1**, 114 (1814).

Elaeagnus argentea Bradbury, Travels, 144, 335 (1817) ; Nutt. Gen. **1**, 97 (1818) ; non Moench, Meth., 638 (1794).

Elaeagnus commutata Bernh. in Allg. Thuer. Gartenz. **2**, 137 (1843) ; Rydb. Fl. Prairies & Plains, 563 (1932).

NORTH DAKOTA. On the argillaceous broken banks of the Missouri, near Fort Mandan (ex Nutt.) ; bluffs near the Mandan nation (ex Bradbury) ; Missouri, *Bradbury* (Taylor 36 in Herb. Hook.).

On the sheet appears the following, in Hooker's hand : " "*Eleagnus*. Differs from Pursh's *E. aquatica* by its oval and obtuse leaves and by the aggregate flowers," Tayl." The specimen is, however, characteristic *E. argentea* Pursh. Pursh described the species from specimens in Lewis' herbarium, collected several years before Bradbury's journey.

9. *Oenothera albicaulis* Pursh, Fl. Am. Sept. **2**, 733 (1814) ; Bradbury, Travels, 336 (1817) ; non Nutt. in Fraser, Cat. (1813) nomen nudum (teste Britton in Mem. Torr. Bot. Club **5**, 234 : 1894) ; Gen. **1**, 245 (1818).

Oenothera pinnatifida Nutt. Gen. **1**, 245 (1818) ; non ex Torr. & Gray, Fl. N. Am. **1**, 494 (1840).

Oenothera Purshii G. Don, Syst. **2**, 688 (1832).

Oenothera Bradburiana Nutt. ex Torr. & Gray, Fl. N. Am. **1**, 494 (1840) ; non *Anogra Bradburiana* Rydb. Fl. Prairies & Plains, 574 (1932).

Anogra albicaulis (*Pursh*) Britton in Mem. Torr. Bot. Club **5**, 234 (1894) ; Rydb. Fl. Prairies & Plains, 573 (1932).

SOUTH DAKOTA. Bluffs, Aricara village (ex Bradbury) ; Little Cedar island, *Bradbury* (*Taylor* 20 in Herb. Hook.) ; on the banks of the Missouri near White river, in denudated argillaceous tracts (ex Nutt.).

" Mr. Nuttall now supposes that he formerly confounded two species under this name [*Oe. pinnatifida*] and proposes the name of *Oe. Bradburiana* for our variety α from which the original description seems to have been chiefly taken " (Torr. & Gray, l.c.). *O. Bradburiana* is therefore a synonym of *O. pinnatifida* ; and both are synonyms of *O. albicaulis* Pursh. The descriptions of Torrey and Gray's var. α and of *O. pinnatifida* Nutt. and *O. albicaulis* Pursh correspond closely with each other and with Bradbury's specimen in Herb. Hook.

Torrey and Gray's var. β , to which Nuttall wished to restrict his original name, *O. pinnatifida*, differs in having somewhat smaller flowers and in being more or less strigose. This interpretation of Nuttall's proposals is confirmed by specimens in Herb. Hook. labelled in Nuttall's hand "*Oenothera Bradburiana*" and "*Oenothera pinnatifida*" ; the former is pubescent with short appressed hairs, the latter strigose.

The strigose species has been maintained by Rydberg as *Anogra Bradburiana*. This is obviously incorrect ; since the species lacks a legitimate name, the following is proposed :

Anogra confusa Rickett, nom. nov. *Oenothera pinnatifida* Nutt. ex Torr. & Gray, Fl. N. Am. **1**, 494 (1840) ; non Gen. **1**, 245 (1818) ; *Anogra Bradburiana* Rydb. Fl. Prairies and Plains, 574 (1932) ; non *Oenothera Bradburiana* Nutt. ex Torr. & Gray, l.c.

10. *Gaura coccinea* Pursh, Fl. Am. Sept. **2**, 733 (1814) ; Bradbury, Travels, 336 (1817) ; non Nutt. in Fraser, Cat. (1813) ; Gen. **1**, 249 (1818).

Gaura parvifolia Torr. in Ann. Lyc. N. Y. **2**, 201 (1828) ; Rydb. Fl. Prairies & Plains, 581 (1932).

Gaura coccinea Nutt. var. **parvifolia** (Torr.) Rickett, comb. nov.

NORTH DAKOTA. Mandan nation, *Bradbury* (*Taylor* 13 in Herb. Hook.).

SOUTH DAKOTA. Bluffs, Aricara village (ex Bradbury).

" I possess an original specimen of this from Mr. Bradbury, gathered about Fort Mandan " (Hook., Fl. Bor.-Am., **1**, 208 : 1834).

G. coccinea Pursh and *G. coccinea* Nutt. are distinct varieties. *G. coccinea* Pursh (ex descript.) and Bradbury's specimen in Herb. Hook. are appressed-pubescent or glabrate, and have a crowded inflorescence and a 4-lobed stigma. *G. coccinea* Nutt. (ex descript.) is more or less hirsute with spreading hairs, and has a lax open inflorescence and a more deeply 4-toothed stigma. Rydberg maintained *G. coccinea* Pursh as *G. parvifolia* Torr. Other very closely related varieties or species have been recognized. The situation is complicated by the existence of a specimen in Herb. Hook. exactly like that of Bradbury but labelled in Nuttall's hand "*Gaura coccinea*." Careful examination of abundant material is necessary to determine the proper classification of these forms. Meanwhile it seems best to regard the form represented by Bradbury's specimen as a variety of *Gaura coccinea* Nutt.

11. *Seseli divaricatum* Pursh, Fl. Am. Sept. 2, 732 (1814); Bradbury, Travels, 336 (1817); Nutt. Gen. 1, 194 (1818).

Musenium divaricatum (Pursh) Nutt. ex Torr. & Gray, Fl. N. Am. 1, 642 (1840).

Musineon divaricatum (Pursh) Coult. & Rose in Bot. Gaz. 20, 259 (1895); Rydb. Fl. Prairies & Plains, 596 (1932).

SOUTH DAKOTA. On the arid and denudated plains of the Missouri, commencing about 30 miles below the confluence of the White river (ex Nutt.).

NEBRASKA. Missouri Bluffs, at the mouth of the L'Eau qui Court (ex Bradbury); bluffs of the Missouri, Bradbury (Taylor 32 in Herb. Hook.).

Musenium Nutt. was evidently a latinized form of *Musineon* Raf. (Jour. Phys. Chim. Hist. Nat. 91, 71: 1820), with which Nuttall must have been familiar.

12. *Selinum acaule* Pursh, Fl. Am. Sept. 2, 732 (1814); Bradbury, Travels, 336 (1817).

Thapsia glomerata Nutt. Gen. 1, 184 (1818).

Cymopterus glomeratus (Nutt.) DC. Prod. 4, 204 (1830).

Cymopterus acaulis (Pursh) Rydb. in Bot. Surv. Neb. 3, 38 (1894); Fl. Prairies & Plains, 600 (1932).

SOUTH DAKOTA. On the open plains of the Missouri, commencing 40 miles below the confluence of the White river (ex Nutt.).

NEBRASKA, KANSAS & MISSOURI. On the alluvion of the Missouri, from the river Naduet to the Mahas (ex Bradbury); 100 up the Missouri, Bradbury (Taylor 22 in Herb. Hook.).

The above citations extend the range of the species (at least its former range) considerably to the east of that given by Rydberg. If by "100 up the Missouri" we understand 100 miles, the specimen was collected in central Missouri. On the other hand, the two other specimens (*Erysimum*, *Myagrum*, q.v.) similarly marked are labelled "1100 [miles] up the Missouri," for which "100 up

the Missouri " might be an error of transcription ; if this is so, the specimen came from South Dakota.

13. *Cynoglossum glomeratum* Pursh, Fl. Am. Sept. **2**, 729 (1814) ; Bradbury, Travels, 336 (1817).

Myosotis glomerata Nutt. Gen. **1**, 112 (1818).

Eritrichium glomeratum (Pursh) DC. Prod. **10**, 131 (1846).

Oreocarya glomerata (Pursh) Greene, Pittonia **1**, 58 (1887) ; MacBride in Contr. Gray Herb. **48**, 29 (1916) ; Rydb. Fl. Prairies & Plains, 669 (1932).

SOUTH DAKOTA. Big Bend, Missouri (ex Bradbury) ; on arid argillaceous hills around the Great Bend of the Missouri (ex Nutt.).

Taylor 30 in Herb. Hook. is almost certainly from Bradbury's collection.

14. *Batschia longiflora* Pursh, Fl. Am. Sept. **1**, 132 (1814) ; Bradbury, Travels, 336 (1817) ; Nutt. Gen. **1**, 114 (1818).

Batschia decumbens Nutt. l.c. (teste Johnston in Contr. Gray Herb. **70**, 25 : 1924).

Lithospermum angustifolium Michx. Fl. Bor.-Am. **1**, 130 (1803) ; Johnston, l.c. ; non Forssk. Fl. Aegypt.-Arab., 39 (1775).

Lithospermum incisum Lehm., Asperif., 303 (1818).

Lithospermum linearifolium Goldie in Edinb. Phil. Jour. **6**, 322 (1822) ; Rydb. Fl. Prairies & Plains, 674 (1932).

Lithospermum longiflorum (Pursh) Spreng. Syst. **1**, 544 (1825) ; non Salisb. Prod. 113 (1796).

MONTANA, NORTH & SOUTH DAKOTA & NEBRASKA. On the banks of the Missouri to its sources (ex Nutt.) ; first occurs near the mouth of the Platte, on ascending the Missouri (ex Bradbury) ; le haut Missouri (Taylor 17 in Herb. Hook. ; undoubtedly collected by Bradbury).

WISCONSIN. Around the Prairie du Chien, Mississippi (ex Nutt.).

" This species [*L. incisum*] has a most extensive range. I possess specimens gathered by Bradbury on the Missouri . . ." (Hook., Fl. Bor.-Am. **2**, 87 : 1838). This undoubtedly refers to the specimen cited above, labelled "*Lith. incisum*." Pursh described the species from specimens of Nuttall's collection ; Bradbury's were probably gathered at or about the same time.

15. **Penstemon glaber** Pursh, Fl. Am. Sept. **2**, 738 (1814) ; Bradbury, Travels, 337 (1817) ; Pennell in Contr. U.S. Nat. Herb. **20**, 348 (1920) ; Rydb. Fl. Prairies & Plains, 713 (1932).

Penstemon eriantherus Nutt. in Fraser, Cat. (1813) nomen nudum (Pennell, l.c.) ; Gen. **2**, 52 (1818).

Penstemon Gordoni Hook. in Bot. Mag. **73**, pl. 4319 (1847).

NORTH DAKOTA. Between Aricara and Mandan nation, Bradbury (Taylor 26 in Herb. Hook.).

SOUTH DAKOTA. Alluvion of the Missouri, above the Big Bend (ex Bradbury) ; in arid soils near the confluence of Shian river (ex Nutt.).

Isotype seen by Pennell in the herbarium of the Academy of Natural Sciences of Philadelphia.

For the sake of simplicity, the correct spelling and gender of *Penstemon* are used in all citations.

16. *Penstemon eriantherus* Pursh, Fl. Am. Sept. **2**, 737 (1814) ; Bradbury, Travels, 337 (1817) ; Rydb. Fl. Prairies & Plains, 714 (1932) ; non Nutt. in Fraser, Cat. (1813) ; Gen. **2**, 52 (1818).

Penstemon cristatus Nutt. in Fraser, Cat. (1813) nomen nudum (teste Pennell in Contr. U.S. Nat. Herb. **20**, 342 : 1920).

Penstemon eriantherus Pursh var. **saliens** (Rydb.) Pennell, l.c., 343.

SOUTH DAKOTA. Common on the bluffs from the big bend to the Aricara village (ex Bradbury) ; on arid denudated argillaceous hills from the confluence of Teeton river and the Missouri to the mountains (ex Nutt.).

NEBRASKA. Sepulchre Bluffs, *Bradbury* (Taylor 25 in Herb. Hook.).

A type or isotype of *P. eriantherus* Pursh is cited by Pennell, l.c. Bradbury's specimen in Herb. Hook. agrees with var. *saliens* Pennell in having leaves strongly toothed on their distal halves, and corolla about 23 mm. long. Evidently the typical form of the species and the variety were included in Bradbury's collections without distinction.

17. *Penstemon Bradburii* Pursh, Fl. Am. Sept. **2**, 738 (1814).

Penstemon grandiflorus Nutt. in Fraser, Cat. (1813) ; Gen. **2**, 53 (1818) ; Pennell in Contr. U.S. Nat. Herb. **20**, 357 (1920) ; Rydb. Fl. Prairies & Plains, 713 (1932).

SOUTH DAKOTA. Chienne rivière, *Bradbury* (Taylor 24 in Herb. Hook.).

NEBRASKA, &c. On the plains of the Missouri, common, from the confluence of the river Platte to the Mountains (ex Nutt.).

WISCONSIN. Near the Prairie du Chien, Mississippi (ex Nutt.).

A probable isotype is cited by Pennell.

18. **Penstemon gracilis** Nutt. Gen. **2**, 52 (1818) ; Pennell in Contr. U.S. Nat. Herb. **20**, 372 (1920) ; Rydb. Fl. Prairies & Plains, 715 (1932).

NORTH DAKOTA. From the Arikarees to Fort Mandan, in depressed soils (ex Nutt.) ; prairies, *Bradbury* (Taylor 23 in Herb. Hook.).

Type is cited by Pennell. According to the same author, Pursh's description of *P. angustifolius* possibly included also this species. Though collected by Bradbury, it was not recognized by him as distinct.

19. **Plantago elongata** Pursh, Fl. Am. Sept. **2**, 729 (1814) ; Bradbury, Travels, 335 (1817) ; Morris in Bull. Torr. Bot. Club **36**, 525 (1909) ; Rydb. Fl. Prairies & Plains, 738 (1932).

NEBRASKA. Near the Maha village (ex Bradbury) ; Sepulchre Bluffs, *Bradbury* (Taylor 28 in Herb. Hook.).

The specimen is undoubtedly that cited by Gray in Syn. Fl. 2, pt. 1, 392 (1886) and identified as *P. pusilla* Nutt., with which *P. elongata* Pursh was long confused. Morris (l.c., 517) was misled by a memorandum from a former member of the Kew staff stating that the specimen in question " was collected by Dr. Taylor at Sepulchre Bluffs, Bradbury." The specimen corresponds exactly with Morris' description of *P. elongata* Pursh (Gray, as quoted by Morris, was mistaken in the number of ovules). Morris cites as type another specimen by Bradbury in the Academy of Natural Sciences of Philadelphia (perhaps more correctly regarded as an isotype).

V—THE GIANT LOBELIAS OF EAST AFRICA.

E. A. BRUCE.

The giant Lobelias of the African Mountains are remarkable plants, and bear little resemblance except in their floral structure to the small species familiar in gardens. It is singular that these "giant" plants, which often attain a height of over 20 feet, should be found in the high alpine regions, where the vegetation, with the exception of the giant *Senecios*, is almost uniformly dwarf. There are, however, a number of forest species, which give a clue to the origin of the alpine forms. *L. longisepala* Engl., for example, which is an annual and has a branched habit, is very different from the other giant Lobelias. This species may be regarded as a relic of the ancestral forest forms from which the giant Lobelias have been evolved. It is confined to the tropical rain forests and has the lowest altitudinal range of any of the giant forms (1500–3000 ft.). This supports the theory put forward by Prof. R. E. & Dr. Th. C. E. Fries that the ancestral form of the giant Lobelias was a branched, glabrous species with a lax inflorescence and thin, scattered leaves, which originated in the primitive forest zone. The dense inflorescence, unbranched stem, and thick, hairy leaves of the existing alpine species may be explained as adaptations due to the higher altitude and more severe climate.

Material of the African species of the genus has been gradually accumulating in the Kew Herbarium, and in view of the interest in these striking plants, it was thought advisable to make a study of them with special reference to their distribution and altitudinal range. In the following pages an attempt has been made to classify the East African members of this genus. The area dealt with includes the Abyssinian mountains and those of the eastern border of the Belgian Congo, Tanganyika Territory, Uganda Protectorate and Kenya Colony (see map, p. 72). The two species, *L. columnaris* and *L. Conraui*, from the Cameroons Mountain and the Cameroons respectively have not been included. Both these West African species, belonging to the *Columnaris* series, differ from the other

giant *Lobelias* in having all the anther-tips glabrous instead of the lower two bearded.

In addition to the material in the Kew Herbarium, specimens have been examined at the British Museum (Natural History), and a number of specimens have been received on loan from Berlin, Brussels, Uppsala and Amani. The writer is very grateful to the Directors of these institutions for their help. The photographs on plate V (facing p. 80) have been reproduced by the kind permission of Mr. B. D. Burt, Dr. W. Geilinger, Mr. G. L. R. Hancock and Mr. A. S. Thomas. The drawings and diagrams are the work of Miss Ross-Craig and Mr. G. Atkinson, to whom the author is much indebted. Thanks are also due to Mr. A. D. Cotton, Keeper of the Herbarium and Library, Royal Botanic Gardens, Kew, and Mr. J. Hutchinson for their valuable advice and criticism.

INTRODUCTORY.

The characters chiefly used in the key are the shape of the bracts and the nature of their indumentum, in conjunction with leaf-form. The character and occurrence of the indumentum are of more value than its relative density. The size of the anthers, a character employed by Professor R. E. and Dr. Th. C. E. Fries in their revision, has been found to vary to a certain degree within many of the species and has therefore not been utilized to any great extent.

Since the Fries' revision, "*Die Riesen-Lobelien Afrikas*," in *Svensk Botanisk Tidskrift*, **16**, 383 (1922), four new species have been described: *L. Bequaertii* De Wild., *L. lanuriensis* De Wild.,* *L. Fenniae* Th. Fries† and *L. Burtii* E. A. Bruce.‡

L. Bequaertii is a distinct species, which is confined to Mt. Ruwenzori. It belongs to the *Deckenii* series, though it also shows some affinity with the *Mildbraedii* series. *L. lanuriensis*, also described from Mt. Ruwenzori, does not appear to differ from *L. karisimbensis* R. E. Fr. et Th. Fr., which occurs on the same mountain as well as on the Virunga Range. These authors, however, consider *L. lanuriensis* to be the same as *L. Stuhlmannii*. This is scarcely the case, as the leaves of *L. lanuriensis* are quite glabrous above, whereas in the type of *L. Stuhlmannii* they are thickly puberulous. *L. Fenniae* Th. Fries is, in the opinion of the writer, synonymous with *L. Telekii* Schweinf. Five different collections from Mt. Elgon, including flowers and seeds, have been examined and compared with specimens of *L. Telekii* from Mt. Kenya and the Aberdares. The corollas appear identical, and the pedicels and calyx-tube have the same type of indumentum, though it is more prolific in the Elgon plants.

L. Burtii E. A. Bruce is an interesting species belonging to the *Deckenii* series and also shows affinity with the *Mildbraedii* series. It has been named after Mr. B. D. Burt, who has contributed much

* De Wild. *Plantae Bequaertianae*, **1**, 289 and 291 (1922).

† Bot. Notiser, 1923, 295.

‡ Kew Bull. 1933, 473.

valuable material of this genus to the Kew Herbarium. *L. Burttii* has been collected on Mt. Meru at an altitude of 12,000–13,000 ft., and also on Mts. Loolmalassin and Hanang at 11,000 ft.; these mountains lie to the west and south-west of Kilimanjaro (see map, p. 72). *L. Burttii* is most nearly allied to *L. Bequaertii*, and in common with this species has the corolla split into five lobes, differing in this respect from the other members of the *Deckenii* series, and forming a definite link with the *Mildbraedii* series. The writer therefore admits only two additional new species of East African giant Lobelias since the publication of the Fries' paper in 1922. The species published in that paper are accepted as distinct with the exception of *L. ulugurensis* Engl., which, in the opinion of the writer, is synonymous with *L. gibberoa* Hemsl. The type specimen of the former has been carefully examined, and as far as can be seen from the rather inadequate material, there is no specific difference.

With these adjustments there are now twenty apparently distinct species from East Africa.

The African giant Lobelias belong to the section *Rhynchopetalum* of Bentham & Hooker*, which was merged by Engler & Prantl† into the Section *Tylonium*. Section *Tylonium* Engl. et Prantl is distinguished as follows:—

- (1) Tall, usually unbranched herbs, sometimes arborescent, with numerous narrow leaves.
- (2) Inflorescence a terminal, many-flowered, bracteate raceme.
- (3) Flowers large, generally blue, violet or purple.
- (4) Anthers large, usually the three upper glabrous at the tip and the two lower bearded.

Species of this section also occur in the West Indies, Brazil, Pacific Islands and India. This type of growth in *Lobelia* has thus a much wider distribution than that of the giant Senecios with which they are associated, but which are confined to the East African mountains.

The East African members of this section of *Lobelia* may be conveniently divided into five main series, as follows:—

- I. LONGISEPALA SERIES: This is the most primitive of the five series, and is characterized by the branching stem and the small, generally reddish-coloured flowers, the corollas of which are split down the back to the base and then deeply lobed, see fig. 1, no. 1, p. 67. The seeds are small, ovoid, and without a winged margin. This series includes two species, *L. longisepala* and *L. lukwangulensis*. The former is of great systematic interest, as has already been pointed out; it occurs on the Usambara Mountains in the primitive rain forests, whereas *L. lukwangulensis* is found in the Uluguru Mountains at a rather higher altitude. The altitudinal range of the series is from 1600–8000 ft.

* Genera Plantarum, 2, 552 (1876).

† Pflanzenfam. 4, 5; 67 (1894).

SPECIES	Virunga	Ruvenzori	Mt. Elgon	Aberdares	Mt. Kenya	Kilimanjaro	Ngorongoro	Usambara	Uluguru	Utshungwe	Rungwe	Abyssinia
<i>L. longisepala</i>								X				
<i>L. lukwangulensis</i>									X			
<i>L. Mildbraedii</i>	X											
<i>L. utshungwensis</i>										X		
<i>L. Rhynchoptalum</i>												X
<i>L. aberdarica</i>			X	X	X							
<i>L. Stuhlmannii</i>		X										
<i>L. karisimbensis</i>	X	X										
<i>L. bambuseti</i>				X	X						X	
<i>L. usafuensis</i>												
<i>L. Volkensii</i>						X						
<i>L. giberroa</i>	X	X	X	X	X	X	X		X	X		X
<i>L. Bequaertii</i>		X										
<i>L. Buritii</i>							X					
<i>L. Deckenii</i>						X						
<i>L. keniensis</i>					X							
<i>L. sattimae</i>				X								
<i>L. elgonensis</i>			X									
<i>L. Telekii</i>			X	X	X							
<i>L. Wollastonii</i>	X	X										

- II. **MILDBRAEDII SERIES** : This is characterized by the nervation of the leaf, the veins ascending at an acute angle and running sub-parallel to the midrib. The bracts vary from linear to broadly lanceolate. The corolla is long and narrow, first splitting down the back and then dividing into 5 linear lobes, see fig. 1. nos. 3-5, p. 67. The seeds are comparatively large, flattened and with a narrowly winged margin. The species included in this series are *L. Mildbraedii*, *L. utschungwensis*, *L. Rhynchopetalum* and *L. aberdarica*. The first two species are found on the Virunga Mountains and the Utshungwe Mountains respectively ; the third is characteristic of the alpine region of the Abyssinian Mountains, and the last is common to Mt. Elgon and the Aberdares, being found in the upper half of the bamboo region. The altitudinal range of the series is from 6000-13,000 ft.
- III. **GIBERROA SERIES** : This has the largest altitudinal range of the series, and contains *L. giberroa*, the most widely distributed species. It is characterized by the nervation of the leaf, the veins spreading almost at right angles from the midrib. The bracts are narrow, the corollas are split down the back and then divided into 5 lobes, see fig. 1, nos. 7-12, p. 67, and the seeds are similar to those of the *Mildbraedii* series, but smaller and with a narrower margin. The series may be sub-divided into two subseries on the leaf shape :—
- A. Leaf broadly oblanceolate : This includes *L. usafuensis*, *L. Volkensii* and *L. giberroa*.
 - B. Leaf narrowly linear-lanceolate : This includes *L. bambuseti*, *L. karisimbensis*, and *L. Stuhlmannii*.
- The species in subseries A are found for the most part in the mountain rain-forests, *L. giberroa* extending to the lower half of the bamboo region ; the altitudinal range of the subseries is from 5000-10,000 ft., and with the exception of the widely distributed *L. giberroa*, is confined to East Tanganyika Territory. The species in subseries B are characteristic of a higher altitude, and occur in the upper half of the bamboo forest and the lower alpine region ranging from 8000-12,000 ft.
- IV. **DECKENII SERIES** : The members of this series are all alpine. It is characterized by the ovate bracts, dense inflorescence, and large seeds with winged margins. It includes the following species, *L. Bequaertii*, *L. Deckenii*, *L. keniensis*, *L. sattimae*, *L. elgonensis* and *L. Burtii*. These occur in the alpine region ranging from about 12,000 ft. upwards, with the exception of *L. Bequaertii* and *L. Burtii* which are found at slightly lower altitudes. As these two species show an affinity with the *Mildbraedii* series in their floral structure, it is interesting to note that they also approach to that series in their lower altitudinal range. The species, with the exception of *L.*

Burtii, are endemic to a single mountain group (see map p. 72) and have not so far been recorded from any other range.

- V. TELEKII SERIES: This is characterized by the woolly and closely long-ciliate bracts and small ovoid seeds without winged margins. It includes the two species *L. Telekii* and *L. Wollastonii*, both of which are higher alpine species, ranging from 11,000–14,700 ft.

Fig. 1 (opposite) shows the inner surface of the opened-out corollas of some of the species mentioned above and illustrates the interrelationship of the groups so far as the form of the corolla is concerned. It will be noted that nos. 3, 5 and 6 are comparatively long and have short lobes whereas 7, 8 and 9 have narrow linear lobes; these belong to the *Mildbraedii* and *Giberroa* series respectively. The *Deckenii* series is characterized by a comparatively broad corolla which is generally one-lipped (nos. 13–18). The presence or absence of indumentum within the corolla is a useful character for specific determination, e.g. *L. Deckenii* (no. 15) is recognized by its lack of indumentum.

Particular attention has been paid to the distribution and altitudinal range of the various species, these points being illustrated by the diagram on p. 69, and the table on p. 64.

The map on p. 72 gives an outline sketch of the area dealt with (excluding Abyssinia). The positions of the chief mountain groups have been indicated and the species occurring on each range have been marked by numbers. By reference to the key it is possible to see at a glance which species occur on the various mountains. It will be noted that a number of species are endemic to a particular mountain, e.g. *L. Bequaertii* (no. 13) has only been recorded from Mt. Ruwenzori, whereas some are widely distributed, e.g. *L. giberroa* (no. 12), which is known from all the larger mountain groups.

The diagram on p. 69 gives a diagrammatic representation of the six more important mountain ranges in the area: Virunga Mts., Mt. Elgon, Aberdare Mts., Mt. Kenya and Mt. Ruwenzori. The altitude, in feet, is marked off on the vertical axis, and the fourteen species involved are represented by various signs on the diagram. Thus, by reference to the figure, it is possible to see the number of species occurring on any one mountain and their altitudinal range; e.g. on Mt. Elgon there are four different species, two of which are found above the 13,000 ft. contour (*L. elgonensis* and *L. Telekii*), and two below 10,000 ft. (*L. giberroa* and *L. aberdarica*).

It is therefore possible, in some cases, to name a species with reasonable certainty if the locality and altitude are known, irrespective of whether the specimen has been examined or not.

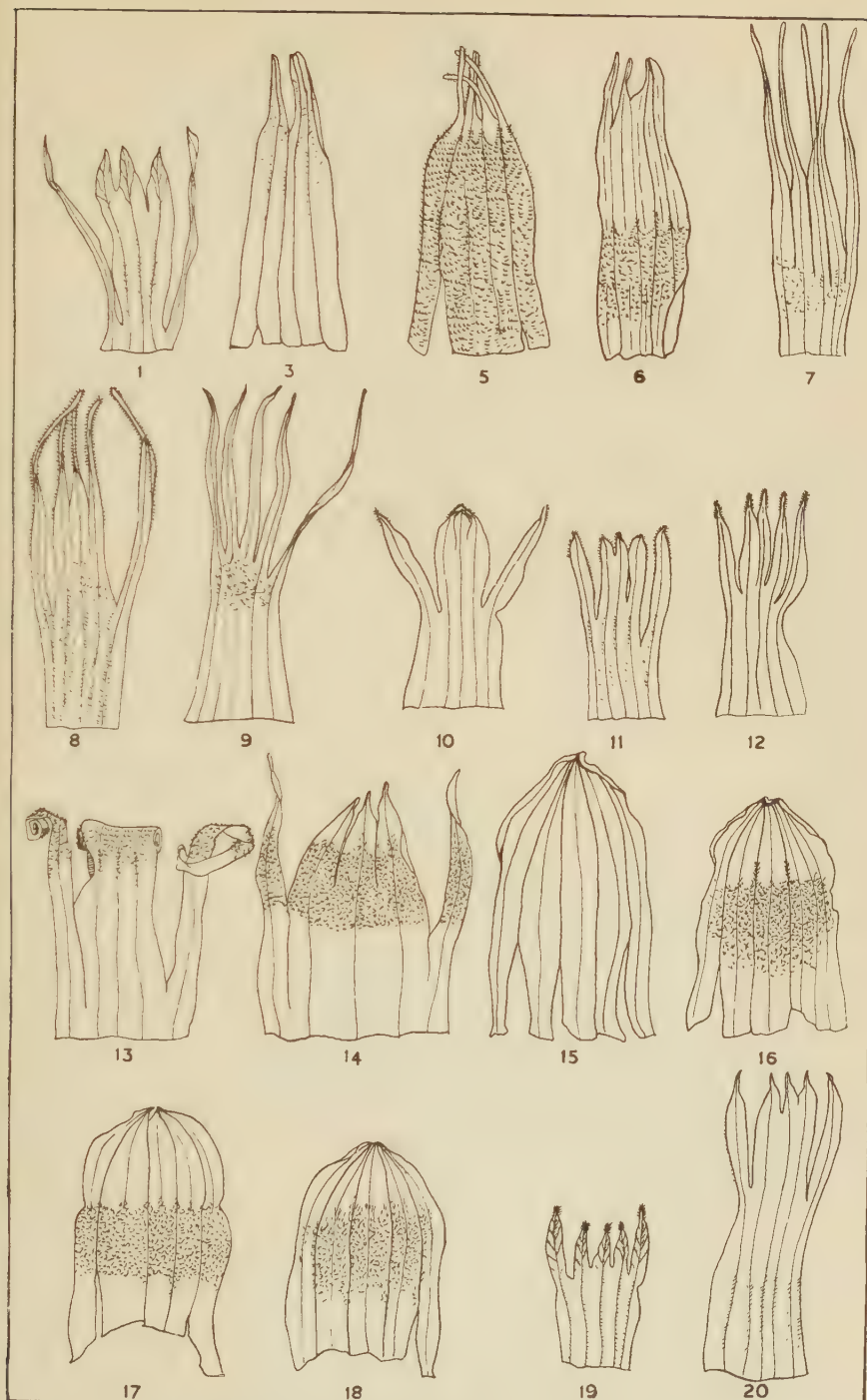


Fig. 1. Opened-out corollas (from inside) of species of giant Lobelias. The numbers correspond to those in the enumeration, pp. 70-87.

KEY TO THE SERIES.

Stem branched ; flowers reddish, seeds ovoid, not winged.....

I. *Longisepala*.

Stem unbranched ; flowers greenish-white or blue :

Bracts neither woolly nor densely long-ciliate ; seeds compressed, more or less winged :

Bracts linear to narrowly lanceolate, if ovate-lanceolate then shorter than the mature flowers :

Leaves with the lateral nerves ascending at an acute angle (30°-45°) from the midrib.....II. *Mildbraedii*.

Leaves with the lateral nerves spreading almost at right angles (60°-90°) from the midrib.....III. *Gibberoa*.

Bracts ovate or oblong-ovate, longer than the mature flowers

IV. *Deckenii*.

Bracts densely woolly or long-ciliate ; seeds ovoid, neither compressed nor wingedV. *Telekii*.

KEY TO SPECIES.

I. LONGISEPALA SERIES.

Inflorescence very lax ; bracts lanceolate, leaf-like ; pedicels long, subequal to or longer than the flowers ; leaves herbaceous, undulate-serrate.....1. *L. longisepala*.

Inflorescence dense ; pedicels definitely shorter than the flowers ; bracteoles conspicuous, over 5 mm. long ; leaves narrowly oblong-ob lanceolate, distantly serrate near the top.....

2. *L. lukwangulensis*.

II. MILDBRAEDII SERIES.

Bracts broadly linear to narrowly lanceolate (4-8 mm. broad) :

Basal leaves 2-5 cm. broad :

Bracts broadly linear (about 4 mm. broad) ; leaves subacute, mucronate at the apex.....3. *L. Mildbraedii*.

Bracts linear-lanceolate (about 6 mm. broad) ; leaves gradually acuminate4. *L. utshungwensis*.

Basal leaves 6-10 cm. broad, gradually acuminate ; bracts narrowly lanceolate, about 8 mm. broad ; corolla densely pubescent outside and closely crisped-pubescent within.....

5. *L. Rhynchoptalum*.

Bracts lanceolate to ovate-lanceolate, shorter than the mature flowers ; leaves oblong-lanceolate, conspicuously reticulate on the lower surface.....6. *L. aberdarica*.

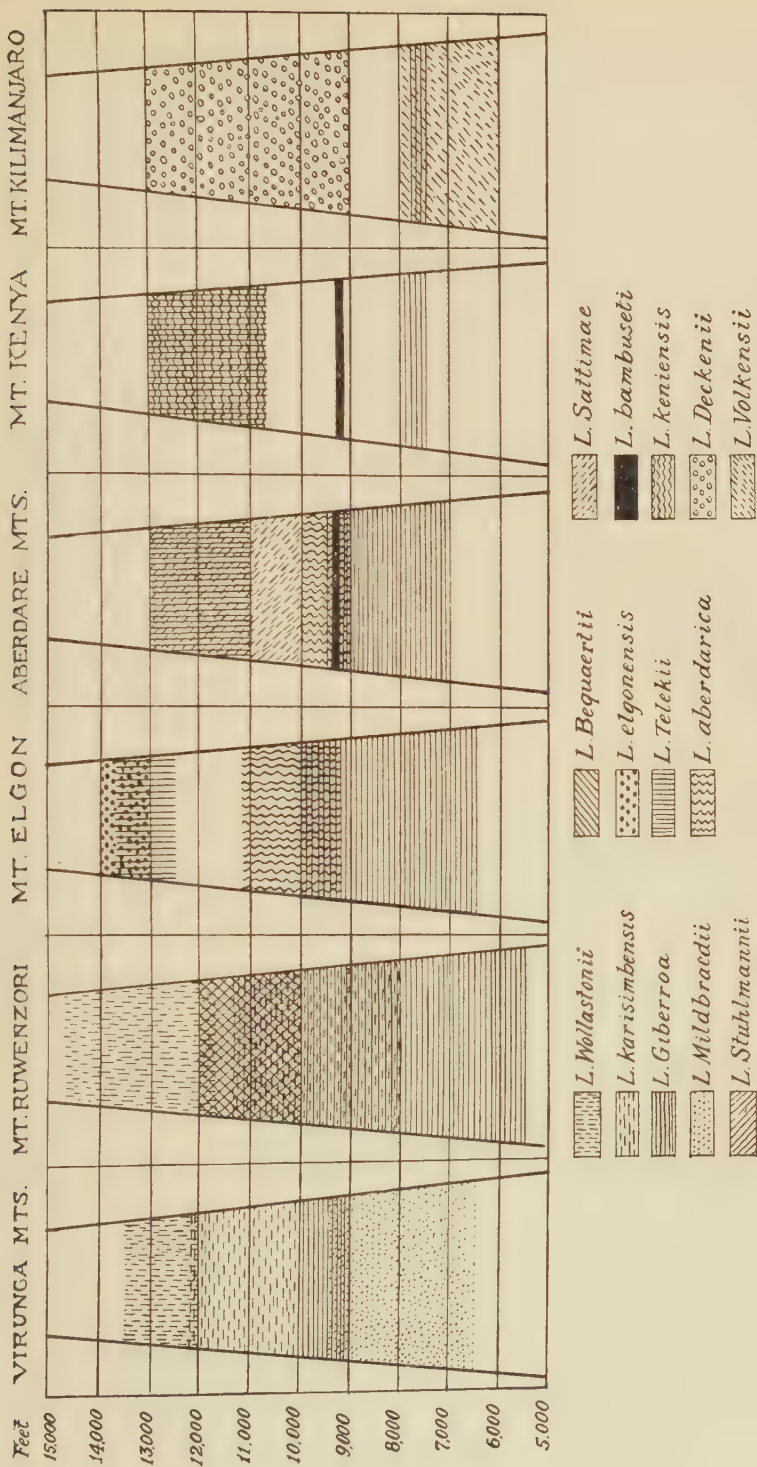
III. GIBERROA SERIES.

Lower stem-leaves lanceolate to linear-lanceolate (including oblong and oblong-lanceolate) :

Leaves distinctly repand denticulate ; corolla, in bud, produced into a long beak (1 cm. or more) beyond the anthers ; bracts subequal to the flowers :

Leaves densely puberulous above ; anthers about 1.4 cm. long

7. *L. Stuhlmanii*.



ALTITUDINAL RANGE OF EAST AFRICAN GIANT LOBELIAS

(Since this diagram was prepared, *L. aberdarica* has been recorded from Mt. Kenya, at 7000 ft.).

Leaves glabrous above ; anthers between 0.9 and 1.3 cm. long

8. **L. karisimbensis.**

Leaves entire or subentire ; corolla, in bud, produced into a short beak (5 mm. or less) beyond the anthers ; bracts linear-filiform, well overtopping the flowers.....9. **L. bambuseti.**

Lower stem-leaves oblanceolate ; corolla, in bud, not or scarcely produced into a beak beyond the anthers :

Leaves generally more or less toothed, the lower ones often doubly serrate :

Bracts much shorter than the mature flowers.....

10. **L. usafuensis.**

Bracts subequal to or longer than the mature flowers :

Corolla and calyx-tube densely woolly tomentose.....

11. **L. Volkensii.**

Corolla and calyx-tube at most pubescent...12. **L. giberroa.**

Leaves entire, oblanceolate to narrowly oblong-oblanceolate ; bracts linear-filiform.....9. **L. bambuseti.**

IV. **DECKENII SERIES.**

Corolla splitting into 5 lobes :

Corolla-lobes reflexed, densely crisped-puberulous within ; bracts broadly ovate, abruptly acuminate.....13. **L. Bequaertii.**

Corolla lobes not reflexed, glabrous within at the top, crisped-pubescent in the centre third ; bracts narrowly ovate, acute or shortly acuminate14. **L. Burttii.**

Corolla one-lipped :

Corolla glabrous within ; bracts glabrous on both surfaces, sparingly ciliate on the margin.....15. **L. Deckenii.**

Corolla crisped-puberulous within :

Anthers pubescent at the base ; bracts pubescent along the midrib on the upper surface, otherwise glabrous.....

16. **L. keniensis.**

Anthers glabrous at the base :

Bracts thinly pubescent on both surfaces ; stamens longer than the split corolla.....17. **L. sattimae.**

Bracts glabrous on both surfaces, only ciliate on the margin ; stamens shorter than the split corolla...18. **L. elgonensis.**

V. **TELEKII SERIES.**

Bracts at least 5 times as long as the flowers, linear, conspicuously long-ciliate on the margin ; leaves thin not shining, with ascending nerves19. **L. Telekii.**

Bracts up to twice as long as the flowers, linear to linear-lanceolate, villous on both surfaces, margin densely so ; leaves coriaceous, shining, with spreading reticulate nerves...20. **L. Wollastonii.**

ENUMERATION.

1. **Lobelia longisepala** *Engl. Bot. Jahrb.* **32**, 117 (1902).

A tall much-branched annual herb, 9-15 ft. high, with a loose branched inflorescence about $1\frac{1}{2}$ ft. long. *Leaves* pale green, herbaceous, shortly petiolate, oblanceolate, 20-35 cm. long and 4-7 cm.

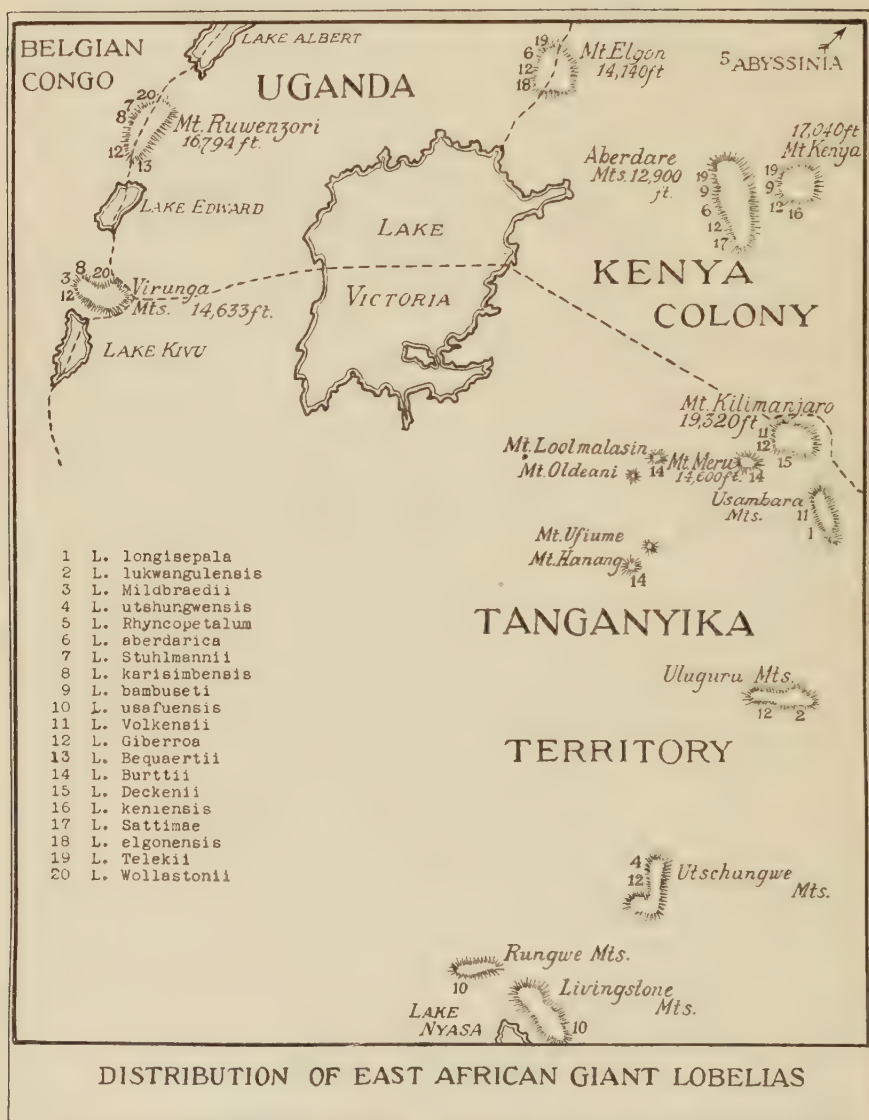
broad, membranous, glabrous on both surfaces, acuminate at the apex, decurrent and narrowly cuneate at the base, margin undulate-dentate; lateral nerves arcuate, ascending at an angle of about 45° , looped within the margin, impressed above, prominent below, tertiary nerves indistinct. *Inflorescence* branched, lax, flowers generally more than 1 cm. apart, rhachis slender, glabrous, about 0.5 cm. in diameter at the base; pedicels glabrous, 2-3 cm. long, bearing 2 linear bracteoles just below the middle. *Bracts* foliaceous, lanceolate, shortly petiolate, from 2.5-6.6 cm. long, and 0.8-2.3 cm. broad, cuneate at the base, acuminate at the apex with a fine mucro, glabrous on both surfaces, serrate on the margin, venation as in the leaves. *Calyx-tube* narrowly campanulate, about 1 cm. long and 0.7 cm. broad at the top, glabrous; lobes broadly linear to narrowly triangular, about 1.5 cm. long and 0.3 cm. broad, glabrous, mucronulate at the apex. *Corolla* lilac, narrowly cylindric in bud, 1.5-2.5 cm. long and about 0.4 cm. broad, thinly and shortly puberulous towards the base, glabrescent in the upper half, splitting down the back and then dividing into 5 lanceolate lobes, the 2 lateral ones free half-way down, the 3 central ones in the upper third. *Filaments* about 1.3 cm. long, puberulous at the base and with short lines of hairs at the apex under the anthers, free in the lowest quarter; *anthers* very small, about 5 mm. long. *Fruit* obovoid, 2-2.5 cm. long, calyx lobes deciduous. *Seeds* very small, ovoid, less than 1 mm. long.—Fries in *Svensk Bot. Tidsk.* **16**, 396 (1922).

Type specimen *Scheffler* 99 in Herb. Berlin.

TANGANYIKA TERRITORY: Usambara Mountains; in the tropical rain forests, in damp and shady places 2600 ft., *Scheffler* 99! Near Amani, *Braun* 793! *Soleman* G6253! In forest below Kwamkoro Road, *Zimmerman* G6254! Open forest 3000 ft., *Groote* G6255! *Groote* 6257! *Warnecke* 448! East Usambara Mts.; Amani, Kwamkoro Road, 3000 ft., in damp rocky places in open parts of evergreen rain forest, *Greenway* 2983!

2. *Lobelia lukwangulensis* Engl. in Notizbl. Bot. Gart. Berlin **1**, 107 (1895).

A large plant 6-12 ft. high with a branched stem and red flowers. *Leaves* narrowly oblong to oblong-ob lanceolate, 30-40 cm. long and 2-3 cm. broad, glabrous on both surfaces, rounded at the apex, mucronate; margin entire in the lower half and distantly serrate towards the apex; lateral nerves arcuate, ascending, anastomosing and forming an impressed reticulum above. *Inflorescence* dense. *Bracts* lanceolate, from 2.5-5.5 cm. long and 0.7-1.6 cm. broad, acute at the apex, glabrous on both surfaces, margin entire. *Flowers* shortly pedicellate, pedicels up to 1 cm. long, puberulous; bracteoles linear-lanceolate, about 8 mm. long and 1.5 mm. broad. *Calyx-tube* broadly campanulate, about 5 mm. long, thinly puberulous; lobes broadly linear, about 2-4 cm. long and 0.3 cm. broad, acute or subacute at the apex, glabrescent on both surfaces, with a



(Since this map was prepared *L. aberdarica* has been recorded from Mt. Kenya).

conspicuous midrib. *Corolla* red, in bud shorter than the calyx lobes, glabrescent, mature flower not seen, but according to Stuhlmann about 2.5 cm. long.—Engl. Bot. Jahrb. **28**, 501 (1900); Goetze and Engl. Vegetationsansicht Deutschostaf. tab. 47 (1902) (Hab.); Fries in Svensk Bot. Tidsk. **16**, 396 (1922).

Type specimen *Stuhlmann* 9142 in Herb. Berlin.

TANGANYIKA TERRITORY: Uluguru Mountains; Lukwangulu district, about 8000 ft., in rain forests, flowering and fruiting in October, *Stuhlmann* 9142!

3. *Lobelia Mildbraedii* Engl. in Wissensch. Ergebn. der deutsch. Zentral-Afrika-Exp. 1907–1908 Bd. **2**, (Botanik) 344 (1911).

Plant 3–10 ft. high, with an inflorescence 2–3 ft. long, bearing a flat rosette of bracts at the apex, frequently found in marshy places. *Leaves* pale green, narrowly oblong to oblong-lanceolate, from 20–30 cm. long and 2–5 cm. broad, sessile, not narrowed to the base, rounded or shortly acute at the apex, mucronate, from glabrous to thinly and shortly pubescent on the lower surface and very sparingly pubescent on the upper, margin entire or subentire; lateral nerves arising at an angle of about 30° from the midrib, ascending, anastomosing. *Rhachis* of the inflorescence thinly pubescent to glabrescent. *Bracts* subequal to the flowers, broadly linear, acute at the apex, 4–5 cm. long and 0.3–0.4 cm. broad, pubescent on both sides, margin entire. *Pedicels* 0.3–0.5 cm. long, pubescent. *Calyx-tube* shortly campanulate, about 0.3 cm. long, pubescent to glabrescent, enlarging in fruit; lobes narrowly triangular, about 1 cm. long and 0.3 cm. broad at the base, acute at the apex, as a rule pubescent on both sides but occasionally glabrescent. *Corolla* pale blue, thinly pubescent, 2.7–3.6 cm. long, 0.3–0.4 cm. broad, produced at the apex into a short point beyond the anthers, splitting into 5 broadly linear lobes, glabrous within. *Filaments* 2–2.6 cm. long, free in the lower quarter. *Anthers* about 1 cm. long. *Seeds* flattened, 1.5–2 mm. long, more or less crescent-shaped with a broad wing.—Fries in Svensk Bot. Tidsk. **16**, 405 (1922).

Type specimen *Mildbraed* 953 in Herb. Berlin.

BELGIAN CONGO: Virunga Mountains; Muhavura Volcano, Gahinga Pass, 9000–9500 ft., locally common on large open marsh, *Burt* 2860! Ninagongo Volcano, the great south extinct crater, about 9000 ft., in open grass areas and among arborescent *Senecios*, *Burt* 3188!

UGANDA: Behungi Swamp; 8000 ft., *Burt* 2939! Kigezi, near Behungi, 6500–7500 ft., common in boggy land in the valleys, *Snowden* 1512! Between Lake Bunyonyi and Behungi, 7800 ft., in upland water meadow or semi-swamp, *Eggeling* 957!

4. *Lobelia utshungwensis* R. E. Fr. & Th. Fr. jr. in Svensk Bot. Tidsk. **16**, 405 (1922).

A large plant with a dense inflorescence about 12 ft. long. *Leaves* 25–35 cm. long, 2·5–3·2 cm. broad, narrowly lanceolate, gradually acuminate, thinly puberulous on both surfaces; margin entire, glabrous; lateral nerves ascending at angles between 30° and 45°, conspicuously reticulate below, indistinctly so above. *Bracts* overtopping the flowers, about 5·5 cm. long and 0·6 cm. broad at the base, narrowly lanceolate to linear-lanceolate, obscurely mucronate at the apex, shortly pubescent on both surfaces, ciliate on the margin. *Pedicels* about 6 mm. long, pubescent. *Calyx-tube* campanulate, shortly pubescent; lobes triangular, about 1·5 cm. long and 0·5 cm. broad at the base, acute at the apex, shortly pubescent on both surfaces, ciliate on the margin. *Flowers* not seen.—*Lobelia* sp. in Engl. Bot. Jahrb. **28**, 501 (1900).

Type specimen *Goetze* 583 in Herb. Berlin.

TANGANYIKA TERRITORY: Utshungwe Mts.; Uhehe, Kissinga about 6600 ft. *Goetze* 583!

According to Fries the corolla is about 3 cm. long and hirsute without; the filaments glabrous and free at the base. This species is allied to *L. Mildbraedii* Engl. from which it is distinguished by the broader bracts.

5. *Lobelia Rhynchopetalum* * (*Hochst.*) *Hemsl.* in Oliv. Fl. Trop. Africa **3, 465 (1877).**

A plant up to 20 ft. high with a leaf rosette up to 12 ft. long. *Upper leaves* narrowly lanceolate, sessile, gradually acuminate, 20–25 cm. long and about 4 cm. broad, both surfaces thinly adpressed-pubescent, margin entire; lateral nerves ascending at an angle of about 30° from the midrib. *Lower leaves* broadly lanceolate, up to 45 cm. long and 10 cm. broad, margin entire, ciliate, both surfaces glabrous or nearly so; lateral nerves prominent ascending at an angle of about 45°. *Bracts* narrowly lanceolate, one-and-a-half times or twice the length of the flower, about 11 cm. long and 0·8 cm. broad, gradually acuminate at the apex, thinly pubescent on both surfaces, ciliate on the margin. *Pedicels* about 0·8 cm. long, pubescent, with 2 linear-filiform bracteoles towards the base. *Calyx-tube* campanulate, about 1·2 cm. long and 0·9 cm. broad, closely pubescent, lobes narrowly linear-triangular about 3 cm. long and 0·7 cm. broad at the base, acute at the apex, pubescent on both sides, ciliate on the margin. *Corolla* bluish-green, up to 5·5 cm. long, produced at the apex into a point about 0·8 cm. long beyond the anthers, pubescent without, densely crisped-puberulous within, splitting down the back and then dividing into 5 linear lobes. *Filaments* about 2·5 cm. long, with 5 lines of pubescence, free in the lower half. *Anthers* about 1·3 cm. long.—Baker fil. in Journ. Bot. **32**, 70 (1894); Karsten and Schenek Veg.-Bild. **7**, t. 30 (1909) (Hab.); Engl. and Drude Veg. Erde **9**, 1, i; 110 (1910) (Hab.); Fries in Svensk Bot. Tidsk. **16**, 407 and fig. 6 g-h (1922). *Rhynchopetalum montanum* Fres. in Flora **21**, **2**, 603 (1838); Mus.

* Misspelt "*Rhynchopetalum*" on map, p. 72.

Senckenberg **3**, 66 tab. 4 (1839) ; DC. Prodr. **7**, 396 (1839). *Tupa Rhynchopetalum* Hochst. in A. Rich. Fl. Abyssin. **2**, 9 (1851).

Type Rüppell s.n. ; Abyssinia ; Simen, 11,000-12,000 ft. in Herb. Berlin.

ABYSSINIA : Simen, Mt. Backit, 11,000-13,000 ft., Schimper 169! 1263! 1554! Petit! 9000-11,000 ft. Steudner 1376! Gara-mulata Mt., 9300-10,700 ft., in Erica formation, stem dies to the ground after flowering but other shoots from the same root do not die, Gillett 5317!

6. Lobelia aberdarica R. E. Fr. & Th. Fr. jr. in Svensk Bot. Tidsk. **16**, 403 and tabs. 5 & 6, a-d. (1922).

Plant about 3-9 ft. high with a flower spike up to 6 ft., though generally less, often found growing in swampy places. *Leaves* pale green, narrowly oblong to oblong-lanceolate, former about 23 cm. long and 2.5 cm. broad, latter about 36 cm. long and 4.5 cm. broad, sessile, not narrowed to the base, apex rounded or subacute, shortly mucronate, thinly pubescent on both surfaces, margin entire or subentire ; midrib thick and fleshy, up to 0.4 cm. in diameter at the base, lateral nerves ascending at angles between 30° and 45° from the midrib, numerous, anastomosing and forming a conspicuous reticulum below. *Rhachis* of the inflorescence sparsely long-pubescent. *Bracts* lanceolate to ovate-lanceolate, shorter than the mature flowers, 2.5-4.5 cm. long, 1-1.5 cm. broad, shortly pubescent on both surfaces, rounded or subacute at the apex, mucronate, thinly ciliate on the margin. *Pedicels* about 0.5 cm. long, densely pubescent. *Calyx-tube* shortly campanulate, thinly to densely pubescent, about 0.4 cm. long, enlarging in fruit ; lobes narrowly triangular to narrowly oblong, 1-1.5 cm. long, 0.3-0.4 cm. broad at the base (elongating in fruit), rounded or subacute at the apex, mucronate, pubescent on both sides and thinly ciliate on the margin. *Corolla* French-blue to lilac-blue and white, thinly pubescent, 2.8-3.5 cm. long, and about 0.5 cm. in diameter, produced at the apex into a short point beyond the anthers, up to 0.5 cm. long. *Filaments* 2.6-3.2 cm. long, free in the lowest third, sparingly pubescent. *Antthers* 0.9-1.1 cm. long.

Type specimen Fries 2414 in Herb. Upsala.

KENYA COLONY : Aberdare Mountains ; in the lower alpine region, Fries 2414! 2414b! 10,000 ft. Battiscombe! Nandi Plateau, Johnston! Timboroa, 9000 ft., Thorold 1502! East Mau, Mariashoni 9000 ft., Dale 2671! Mt. Kenya ; 7000 ft. on the south slope of the forest in a swamp, Dale 3020! Mt. Elgon ; 9200 ft., only found near water, Lugard 434! Daughlish 69! A swamp variety at 11,500 ft. and lower altitudes, Mrs. D. R. Tweedie C.9!

UGANDA : Mt. Elgon ; Bulambuli, stream in bamboo zone, locally abundant, 9100 ft., Thomas 654! Soundy and Hancock! Specimen raised from seeds sent from Tropical East Africa, 7000 ft., Lady Hindlip!

7. **Lobelia Stuhlmannii** Schweinf. in Emin Pascha, Im Herz von Afrika. 291, tab. 11 (1893), *nomen nudum*.

Upper leaves linear-lanceolate, about 20 cm. long and 2 cm. broad, closely repand-denticulate, lateral nerves spreading from the midrib at an angle of about 60°, conspicuously reticulate on the lower surface; upper third of leaf subglabrous below except for the shortly pubescent midrib, lower part covered with a number of long hairs, particularly towards the midrib; upper surface of leaf densely puberulous, lateral nerves invisible. *Bracts* about 4 cm. long and 0.4 cm. broad, narrowly linear-lanceolate, acute at the apex, glabrous on both sides with a few long hairs on the margin near the base. *Calyx-tube* narrowly campanulate, glabrescent; lobes narrowly linear-triangular, about 1.8 cm. long and 0.2 cm. broad at the base, acute at the apex, glabrous on both sides, ciliate on the margin in the lower part, glabrous at the top. *Corolla* glabrous, 5-5.5 cm. long, produced into a beak at the apex beyond the anthers, beak about 1.5 cm. long. *Filaments* about 2.3 cm. long, shortly pubescent at the top. *Anthers* about 1.4 cm. long. *Fruit* not seen.—H. H. Johnston, Uganda: 161, 167, 317 (1902); Baker fil. in Journ. Linn. Soc. Bot. **38**, 266, and tab. 16 (1908); Fries in Svensk Bot. Tidsk. **16**, 400 (1922).

Type specimen *Stuhlmann* 2406 in Herb. Berlin.

UGANDA: Ruwenzori; between 10,000 and 12,000 ft., *Stuhlmann* 2406! According to Stuhlmann's label the leaves are pale green with a purple apex and there is a conspicuous leaf-rosette; yellowish-white latex is also present.

This species has been confused with *Lobelia karisimbensis* R. E. & Th. Fries, but can be distinguished from it by the densely puberulous upper surface of the leaves.

8. **Lobelia karisimbensis** R. E. Fr. & Th. Fr. jr. in Svensk Bot. Tidsk. **16**, 400 (1922).

A plant 4-14 ft. high with a long bare stem, crowned by a rosette of leaves from which the inflorescence arises. *Leaves* up to 45 cm. long and 3.5 cm. broad, narrowly linear-lanceolate, gradually tapering to the sessile base, acute at the apex, glabrous above, sparsely covered with long hairs beneath especially at the base and on each side of the midrib, margin closely repand-denticulate; lateral nerves spreading at an angle of about 60° from the midrib, anastomosing to form a conspicuous reticulum below. *Bracts* adpressed to the spike, about 4 cm. long and 0.5 cm. broad, shorter than the flowers, narrowly lanceolate, gradually tapering to the acute apex, glabrescent on the lower surface, thinly hairy to glabrescent above, thinly ciliate on the margin towards the base, glabrous at the apex. *Pedicels* about 0.4 cm. long, glabrous to pubescent. *Calyx-tube* campanulate, about 0.4 cm. long, glabrescent to pubescent; lobes narrowly triangular, acute at the apex, 1.5-2.3 cm. long, about 0.3 cm. broad at the base, glabrous to thinly

pubescent above, glabrous below, margin ciliate. *Corolla* purplish-chocolate, up to 5 cm. long, produced into a beak about 1.8 cm. long in front of the anthers, puberulous to glabrescent without, puberulous within. *Filaments* about 2.3 cm. long, thinly pubescent, free at the base. *Anthers* 0.9–1.2 cm. long.—*Lobelia Stuhlmannii* Engl. in Wissensch. Ergebn. d. deutsch. Zentral-Afrika-Exp. **2**, 344 (1911), non Schweinf. *Lobelia lanuriensis* De Wild. in Rev. Zool. Afr. **8**, Suppl. Bot. 29 (1920), and Plant. Bequaert. **1**, 291 (1922).

Type specimen *Mildbraed* 1603 in Herb. Berlin.

BELGIAN CONGO: Virunga Mountains; Karisimbi Volcano, 10,000–10,700 ft., *Mildbraed* 1603! Vissoke Volcano, 11,000–12,100 ft. near summit of volcano, *Burt* 3020! Mgahinga Volcano, 11,000–11,400 ft., on the crater-rim *Burt* 2830! Mt. Mgahinga, 11,400 ft. in the crater, *Eggeling* 1058! Mt. Ruwenzori; Lanuri Valley, 10,400–11,400 ft., *Bequaert* 4518!

UGANDA: Mt. Ruwenzori; 8000–10,000 ft., *Johnston*! 9000–11,000 ft., *Dawe* 563! Kigo, 11,000 ft., *Fishlock and Hancock* 122! Butaqu Valley, about 11,000 ft., *Scott-Elliot* 7868! 10,000 ft., *Oliver* 17!

This species is very near to *L. Stuhlmannii* and only appears to differ in the glabrous upper surface of the leaf and the smaller flowers. As the type specimen of *L. Stuhlmannii* consists of inadequate material it may, when further material has been examined, prove to be the same as *L. karisimbensis*. Fries separated the two species on the size of the anthers and the smaller pubescent flowers. According to him *L. Stuhlmannii* has only been recorded from Ruwenzori and *L. karisimbensis* from the Virunga Mountains.

I have been able to examine five different collectings from the Virunga Mountains and found the corollas to be pubescent in all cases and the size of the anthers to vary from 0.9–1.1 cm. These two characters fit Fries's description of *L. karisimbensis* except for the slightly larger anthers. Four different collectings have been examined from Mt. Ruwenzori; in two cases the corolla was subglabrous and in two it was definitely pubescent, whilst the size of the anthers varied from 1–1.3 cm. These facts seem to show that the original conception of the species *L. karisimbensis* must be slightly enlarged so as to include those specimens with larger anthers and subglabrous flowers.

The distribution is also widened so as to include Mt. Ruwenzori.

9. *Lobelia bambuseti* R. E. Fr. & Th. Fr. jr. in Svensk Bot. Tidsk. **16, 401 and tabs. 4, 6, i-1 (1922).**

Plant about 12 ft. high. *Leaves* sessile, narrowly lanceolate to oblong-lanceolate, acute at the apex, basal ones 30 cm. long and 5 cm. broad, upper ones about 25 cm. long and 2 cm. broad, slightly pubescent on the upper surface particularly on the midrib, becoming glabrescent; lower surface thinly hirsute on the nerves and margin; margin entire or subentire; midrib prominent on the lower surface,

about 3 cm. thick at the base, lateral nerves spreading at an angle of about 60° from the midrib. *Rhachis* of the inflorescence pubescent. *Bracts* linear-filiform, longer than the flowers, about 8 cm. long and 0.2–0.3 cm. broad at the base, gradually tapering to a fine point at the apex, thinly ciliate on the margin, otherwise glabrescent. *Pedicels* about 0.5 cm., long, glabrescent. *Calyx-tube* campanulate, glabrous or glabrescent; sepals linear to narrowly triangular, tapering to the acute apex, about 2.5 cm. long and 0.2 cm. broad at the base, ciliate on the margin, otherwise glabrescent. *Corolla* greenish-white, glabrous, about 4 cm. long and 0.4 cm. in diameter, produced at the apex into a short point (about 0.5 cm.) beyond the anthers, splitting into 5 linear lobes. *Filaments* about 3 cm. long, free in the lower third. *Anthers* 0.9–1 cm. long.

Type specimen *Fries* 2257 in Herb. Upsala.

KENYA COLONY: Aberdare Mountains; the Upper bamboo zone, *Fries* 2257! Kinangop, Loreko, in the bamboo region, *Napier* 1261! *Evan James*! Mt. Kenya; in the upper part of the bamboo region, *Fries* 919!

10. *Lobelia usafuensis* Engl. Bot. Jahrb. **30**, 420 (1901).

Plant 9–20 ft. high. *Rosette-leaves* subsessile, oblanceolate, up to 75 cm. long and 13 cm. broad, gradually narrowed to the base, apex shortly acuminate, margin doubly serrate, teeth deltoid with upcurved mucro; lower portion of leaf indistinctly serrate; lateral nerves spreading at angles between 60° and 90° from the midrib; upper surface glabrous, lower surface glabrescent; midrib about 1 cm. thick at the base. *Cauline leaves* sessile, lanceolate, gradually narrowed to the apex, serrate on the margin, glabrous above, slightly pubescent below. *Rhachis* of the inflorescence pubescent, flowers forming a dense raceme. *Bracts* shorter than the flowers, linear-lanceolate, about 1.5 cm. long and 0.4 cm. broad at the base, gradually tapering to the apex; margin indistinctly serrate, both surfaces pubescent. *Pedicels* about 0.4 cm. long, pubescent. *Calyx-tube* campanulate, about 0.4 cm. long, shortly and closely pubescent; lobes oblong-lanceolate, acute at the apex, 1–1.5 cm. long, 0.2–0.3 cm. broad, shortly pubescent without, glabrescent within. *Corolla* cylindric in bud, about 2.5 cm. long and 0.3 cm. broad, apex produced to a short point beyond the anthers (about 1 mm. long), pubescent outside, more densely so towards the apex, becoming glabrescent at the base. *Filaments* about 2 cm. long, free in their lowest quarter. *Anthers* 1–1.1 cm. long.—Goetze and Engl. Vegetationsansicht Deutsch. Ost-Afr. tab. 51 (1902) (Hab.); *Fries* in Svensk Bot. Tidsk. **16**, 399 and tab. 3 f-g (1922).

Type specimen *Goetze* 113 in Herb. Berlin.

TANGANYIKA TERRITORY: North of Lake Nyasa; Kyimbila district, about 4400 ft., *Stolz* 1662! Usafua Mts. (Rungwe) about 7500 ft., *Goetze* 1133! Livingstone Mts., Njombe, about 6000 ft., *Lynes* Fr. 72a! Fr. 72b! Fr. 72c! Rungwe District, about 5500 ft. *Geilinger* 1999! 2159! 2314! 2352!

11. **Lobelia Volkensii** Engl. Bot. Jahrb. **19**, Beibl. 47, 49 (1894).

A shrubby plant up to 18 ft. high, the inflorescence up to 6 ft. long. *Basal leaves* oblanceolate, 40–80 cm. long and 8–14 cm. broad, glabrous above, pubescent on the nerves below, midrib pale red; margin doubly serrate, the teeth ascending: lateral nerves spreading at an angle of about 90° from the midrib, prominent below, impressed above, anastomosing. *Cauline leaves* sessile, oblanceolate, narrowed to the base, acute at the apex, margin finely serrate, teeth inconspicuous, very short, erect: lateral nerves spreading at angles between 60° and 90° from the midrib, not distinctly looped within the margin; lower surface pubescent, particularly on the midrib, upper surface glabrescent. Leaves just beneath the inflorescence linear-lanceolate, closely pubescent on the lower surface, thinly so on the upper. *Rhachis* of the inflorescence pubescent. *Bracts* linear to linear-lanceolate, longer than the flowers, about 6 cm. long and 0.3 cm. broad at the base, gradually tapering to a fine point at the apex, margin indistinctly and distantly serrate, teeth short, erect; both surfaces pubescent, lower more densely so. *Pedicels* about 0.5 cm. long, pubescent, bearing 2 small linear, ciliate, bracteoles about half-way down. *Calyx-tube* campanulate about 0.5 cm. long, densely tomentose, forming a thick mat on the surface; lobes narrowly oblong-lanceolate, 1.4–1.8 cm. long, and about 0.3 cm. broad, densely pubescent without, thinly so within. *Corolla* bluish-violet above, greenish below, cylindric in bud, 2.2–2.6 cm. long, and about 0.4 cm. broad, rounded at the apex, densely woolly-tomentose near the apex, glabrescent below, splitting into 5 narrowly oblong lobes. *Filaments* 1.5–2 cm. long, free in the lowest quarter. *Anthers* 0.9–1 cm. long.—Volkens, Kilimandscharo, 301 (1897) (Hab.).

Type specimen *Volkens* 1501 in Herb. Berlin.

TANGANYIKA TERRITORY: Mt. Kilimanjaro; found especially alongside streams and in the forest, in Marangu district about 7600 ft., also fairly common between 6000 and 8000 ft., *Volkens* 1501! Near Marangu, 6500 ft., *Groote* 4007!

According to Fries specimens have also been collected from West Usambara at an altitude of about 5000 ft.

This species is very close to *L. giberroa* and resembles it in habit as well as floral characters. It is only separated from it by the woolly indumentum on the calyx-tube and the smaller anthers. On examination of further material from the district it may prove to be only a form of *L. giberroa*, which is a very variable species. This view is strengthened by the fact that a specimen of *Haarer's* (No. 1758) from Useri, Kilimanjaro, has the smaller anthers of *L. Volkensii* but the indumentum of *L. giberroa*, into which species it has been placed. *Burt* 2376 from Mt. Ufume also appears intermediate.

12. **Lobelia giberroa** Hemsl. in Oliv. Fl. Trop. Afr. **3**, 465 (1877).

Plant 10–20 ft. high, with an inflorescence 3–6 ft. long. *Basal leaves* sessile, broadly oblanceolate, up to 60 cm. long and 16 cm. broad, narrowed to the base, acuminate at the apex; margin generally doubly serrate, with the teeth spreading outward or slightly upcurved; lateral nerves spreading at angles between 60° and 90° from the midrib, looped within the margin; lower surface thinly pubescent to glabrescent, upper surface glabrous, or slightly pubescent on the midrib. *Upper leaves* narrowly oblanceolate, becoming linear-lanceolate just below the inflorescence, apex long-acuminate, lateral nerves ascending at a more acute angle than in the basal leaves. *Rhachis* pubescent, flowers forming a dense raceme. *Bracts* linear, longer than the flowers, up to 7 cm. long and 0.3 cm. broad, shortly pubescent on both surfaces; margin indistinctly serrate with upcurved teeth. *Pedicels* 0.4–0.8 cm. long, pubescent, with 2 small, linear bracteoles towards the base. *Calyx-lobes* 5, oblong to linear-lanceolate from a deltoid base, acute at the apex, 1.5–2 cm. long and 0.2–0.3 cm. broad, pubescent on both sides; tube shorter than the lobes, campanulate, about 0.5 cm. long, thinly to densely pubescent. *Corolla* greenish-white, 2.5–3 cm. long and about 0.5 cm. broad, cylindric in bud, generally rounded at the apex, but sometimes produced to a small point beyond the anthers, thinly pubescent at the base to densely crisped-pubescent at the apex, splitting into 5 linear-lanceolate lobes, glabrescent within. *Filaments* about 2 cm. long slightly pubescent, free in their lowest quarter. *Anthers* 0.9–1.2 cm. long.—Rendle, Bak. f. & S. Moore in Journ. Linn. Soc. **38**, tab. 17 (1908) (Hab.); Fiori in Bull. Soc. Bot. Ital. 1910, 60; 1911, 127, 128. Fries in Svensk Bot. Tidsk. **16**, 397 (1922). *Tupa Schimperii* Hochst. in A. Rich. Fl. Abyssin. **2**, 10 (1851). *Lobelia ulugurensis* Engl. in Pflanzenl. Ost-Afr. **3A**, 92 (1895). *Lobelia Volkensii* Engl. var. *ulugurensis* Engl. in Notizbl. bot. Gart. Berlin **1**, 106 (1895). *Lobelia squarrosa* Bak. in Kew Bull. 1898, 157.

Type specimen *Schimper* 908 in Herb. Kew.

UGANDA: Western Ankole; 5000–7000 ft., *Doggett*! 5000 ft., *Dawe* 341! Ruchiga, 7100–7200 ft., *Bagshawe* 436! Ruwenzori, 6000–7500 ft., *Dawe* 565! Mihuya, 5500–8000 ft., *Fishlock and Hancock* 211! *Humphreys* 551! 8000–10,000 ft., *Fyffe* 41! Mt. Elgon; open forest above Bulambuli, 10,000 ft., *Liebenberg* 1677! Near Sipi, in dry country near the end of the forest, 6000 ft., *Wallace*!

EASTERN SUDAN: Imatong Mts. near Agoro, 6500 ft., in a wet gully, *Brasnett* 1181! 5500 ft., in a sheltered ravine, *Chipp* 56!

KENYA COLONY: Mt. Elgon; 8200 ft., *Lugard* 519! Mt. Kenya; 7600 ft., *Fries* 719! Aberdare Mts.; common in forest clearings, 7000–9500 ft., *Battiscombe* 531! Limoru, 7000 ft., in a wooded ravine, *Dummer* 1665! Above Nakuru, by a swamp near Bahati Forest Station, 7800 ft., *Dale* 2670!

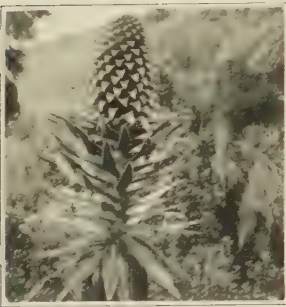
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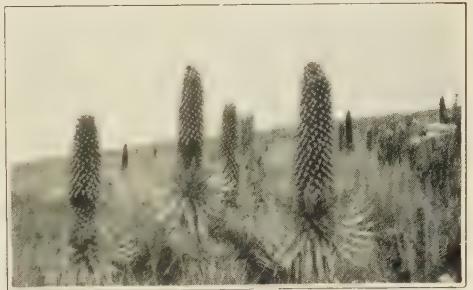
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Giant Lobelias in their natural habitats. 1, *L. Deckenii*; 2, *L. Mildbraedii*; 3 and 4, *L. Burtii*; 5, *L. Bequaertii*; 6, *L. Telekii*.

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BELGIAN CONGO: Virunga Mountains; Namlagira Volcano, 9000–10,000 ft., *Burt* 3140! Vissoke Volcano, in *Hagenia-Hyppericum* wood, 9000 ft., *Burt* 3018!

TANGANYIKA TERRITORY: Utshungwe Mts., 5900 ft., *Goetze* 626! Ufiume Mts., 7000 ft., *Burt* 2376! Mt. Kilimanjaro, Useri, 7500 ft., *Haarer* 1758! 7150 ft., *Geilinger* 4694! Mt. Meru, 5800 ft., *Geilinger* 3769!

ABYSSINIA: Mt. Aber, between Addessalam and Maizacholo, 8000–8300 ft., *Schimper* 908! Mt. Zuquala 9000–9665 ft., *Hugh Scott* s.n.!

13. *Lobelia Bequaertii* De Wild. in Rev. Zool. Afr. **8**, Suppl. Bot. **31** (1920).

Plant 6–16 ft. high with a large hollow stem 6–8 ins. diameter. *Leaves* sessile, broadly lanceolate, broadest below the middle, gradually narrowed to the rounded apex, 23–32 cm. long, 5.5–7 cm. broad, margin entire or obscurely crenulate at the apex, sparsely ciliate to glabrous; under surface glabrous, upper surface sparsely covered with long hairs, more densely so towards the base: midrib fleshy, prominent below, about 1.4 cm. broad at the base; lateral nerves conspicuous on the lower surface, ascending at an angle of about 45° from the midrib. *Bracts* longer than the flowers, ovate, broadest about or slightly above the middle, sessile at the base, 6.5–9.5 cm. long, 3.5–6 cm. broad, rather abruptly long-acuminate at the apex, acumen 1–2 cm. long; margin obscurely undulate and thinly ciliate, otherwise glabrous. *Pedicels* about 0.7 cm. long, glabrous, with 2 fleshy bracteoles towards the base. *Calyx-tube* hemispherical, 0.6–0.8 cm. long, enlarging in fruit, glabrescent; lobes triangular, glabrous, 1–1.3 cm. long and about 0.4 cm. broad at the base, rounded or subacute at the apex, very sparsely ciliate on the margin to glabrous. *Corolla* violet, splitting into 5 strap-shaped lobes about 2.5 cm. long and 0.2 cm. broad, reflexed at the apex, glabrous without, densely crisped-pubescent within at the apex; stamens well exerted from the corolla. *Filaments* 2.4–3 cm. long, free in the lower half. *Anthers* about 1.1 cm. long.—De Wild. *Plantae Bequaert*. **1**, 289 (1922). *Lobelia Deckenii* Hemsl. partly; H. H. Johnston Uganda **1**, 162, 163, 172, 173 (1902) (Hab.); Rendle, Bak, f. & S. Moore in Journ. Linn. Soc. Bot. **38** t. 17, fig. 4 (1908); Chiovenda and Cortesi in Il. Ruwenzori Angiosp. t. 15–18 (1909).

Type specimen *Bequaert* 4519 in Herb. Brussels.

UGANDA: W. Ruwenzori; Kigo, 11,000 ft., *Fishlock* and *Hancock* 123! E. Ruwenzori; 10,000–11,000 ft., *Dawe* 561! *Humphreys* 519! 10,000–12,000 ft. *Doggett*!

14. *Lobelia Burtii* E. A. Bruce in Kew Bull. 1933, 473.

Erect plant with an inflorescence 1½–4 ft. long; the young plants have their leaf-rosettes borne on an axis 1–1½ ft. high. *Lower leaves* lettuce-green, sessile, linear-lanceolate to narrowly



Fig. 2. *Lobelia Burtii* E. A. Bruce. A, part of inflorescence ($\times \frac{2}{3}$); B, leaf ($\times \frac{2}{3}$); C, leaf margin ($\times 12$); D, bract ($\times \frac{2}{3}$); E, corolla ($\times 1$); F, calyx ($\times 1$); G, androecium and gynoecium ($\times 1$); H, anther ($\times 2$); I, seed ($\times 8$).

ovate-lanceolate, 14–25 cm. long, 3–5 cm. broad, broadest just below the middle, gradually narrowed to the rounded or subacute apex, which is sometimes minutely apiculate; margin entire, ciliate, both surfaces dull, glabrous; lateral nerves ascending at an angle of about 45° from the midrib, inconspicuous on the upper surface, visible below. *Upper leaves* lanceolate to linear-lanceolate, narrowed to the acute apex, 14–17 cm. long, 2.5–3 cm. broad, otherwise as above. *Bracts* about twice as long as the flowers, ovate to ovate-lanceolate, 6–9 cm. long, 2.5–3.5 cm. broad, broadest just below the middle, gradually narrowed to the shortly acuminate apex; margin entire, thinly ciliate, otherwise glabrous. *Pedicels* glabrous, about 1 cm. long or less, bearing just below the middle two small, fleshy, triangular bracteoles about 1.5 mm. long. *Calyx-tube* campanulate, glabrous, in bud 4–9 mm. long, 4–6 mm. broad, in fruit 0.8–1.5 cm. long and about 1 cm. broad; lobes narrowly lanceolate to triangular, rounded to acute at the apex, minutely apiculate, glabrous on both sides, sparingly ciliate on the margin, in bud 0.7–1.2 mm. long, 2–4 mm. broad at the base, in fruit up to 1.5 cm. long and 0.5 cm. broad at the base. *Corolla* indigo-blue, lilac or violet, glabrous without, about 3 cm. long, splitting down the back and then dividing into 5 lobes; lobes erect, the 2 lateral ones free to the middle, the 3 central ones free at the apex, united in the lower three-quarters, broadly linear, acuminate, crisped-pubescent in the middle-third within, otherwise glabrous. *Filaments* about 2 cm. long, glabrous, free in the lower half. *Anthers* about 0.9 cm. long.

Type specimen *Burt* 4049 in Herb. Kew.

TANGANYIKA TERRITORY: Mbulu district; Mt. Hanang, 11,000 ft., in the mossy shade of lava cliffs on the west face of the crater, just below the summit of the mountain, *Burt* 4049! Arusha district; Mt. Meru, on the south side of the cone, 12,000–13,000 ft., among *Helichrysum Newii* and spp., also *Erica*, *Philippia* and *Alchemilla*, most prevalent in ravines, *Burt* 4128! Mbulu district; Ngorongoro, Mt. Loolmalassin, 11,000 ft., in a small marsh on the south side of the mountain in a valley among *Erica arborea*, *Philippia*, *Stoebe*, *Adenocarpus* and *Artemisia*, *Burt* 4214!

15. ***Lobelia Deckenii* Hemsl.** in Oliv. Fl. Trop. Afr. 3, 466 (1877).

Plant 3–12 ft. high. *Leaves* lanceolate to linear-lanceolate, sessile, broadest just above the base, gradually narrowed to the acute apex, 16–24 cm. long, 2.5–3.5 cm. broad, margin entire or slightly undulate towards the apex, both surfaces bearing a few scattered hairs or glabrescent; lateral nerves ascending at an angle of about 30° from the midrib, anastomosing, impressed above, slightly raised beneath. *Bracts* longer than the flowers, ovate or oblong-ovate, broadest about the middle, slightly narrowed to the sessile base, 7.5–10 cm. long, 2.8–4 cm. broad, acute or acuminate at the apex, with a distinct midrib and anastomosing lateral veins, glabrous on both sides, margin entire or slightly crenulate-undulate,

very sparingly ciliate. *Pedicels* glabrous, about 0·7 cm. long, bearing 2 small triangular bracteoles halfway up. *Calyx-tube* campanulate, about 0·5 cm. long, glabrous, lobes narrowly triangular, 1–1·3 cm. long, 0·3–0·5 cm. broad at the base, acute or subacute at the apex, mucronate, enlarging in fruit, glabrous on both sides, ciliate on the margin. *Corolla* vivid blue, one-lipped, not splitting into lobes, 3·5–4·5 cm. long, lip about 1·5 cm. across when spread out, glabrous within and without, stamens exerted from the corolla when split. *Filaments* 4–4·5 cm. long, free in the lowest third. *Anthers* about 1 cm. long, or more.—Karsten and Schenck, Veg. Bild. **12**, tab. 9, 10 (1919); Fries in Svensk Bot. Tidsk. **16**, 408 (1922). *Tupa (Rhynchopetalum) Deckenii* Aschers. in Sitzungsber. d. Gesellsch. Naturf. Freunde 1868, **23** (1869); Bot. Zeit. 1869, 71; C. C. von der Decken, Reisen in Ost-Afrika, **3**, 3, p. 74, tab. 5 (1879). *Tupa Kerstenii* Vatke in Linnaea, **38**, 725 (1874). *Lobelia Tayloriana* Bak. f. in Journ. Bot. **32**, 67, tab. 341 (1894).

Type specimen *Kersten* in Herb. Berlin.

TANGANYIKA TERRITORY: Kilimanjaro, above Mamba 8500 ft., *Volkens* 773! 12,000–13,000 ft., *Johnston* 115! Between Peter's Hut and the Saddle, associated with *Senecio Cottonii*, 13,000 ft., *Burt* 2331! *Milne* 10/7! Between Umbwe and Weru Weru rivers, 11,000 ft., in Giant Heath-*Brayera-Podocarpus* forest, *Greenway* 3143! Grassy slope above Moschi, 10,000 ft., *Uhlig* 87! *Uhlig* 103! On a stony slope by stream at Garanga 12,000 ft., *Uhlig* 1098! Bismarkhugel 10,000 ft., *Groote* G.6256! Above Machanve, 12,500 ft., *Moreau* 58a!

16. *Lobelia keniensis* R. E. Fr. et Th. Fr. jr. in Svensk Bot. Tidsk. **16, 413, tab. 2 and 7 c–g (1922).**

Leaves lanceolate, sessile, broadest just below the middle, gradually narrowed to the subacute apex, 19–24 cm. long, 5–5·5 cm. broad, margin entire, ciliate towards the base; upper surface of leaf densely matted-pubescent in lower third, glabrous towards the apex; lower surface glabrous; midrib fleshy, lateral nerves ascending at an angle of about 30°, anastomosing, conspicuous on both surfaces. *Bracts* longer than the flowers, ovate, broadest about the middle, sessile at the base, gradually acuminate at the apex, 6·5–10 cm. long, 3–4 cm. broad, margin entire in the lower half, obscurely crenulate near the apex, midrib and lateral nerves distinct; lower surface glabrous or with a few hairs near the base, upper surface with long hairs on the midrib, otherwise glabrous; margin ciliate, more densely so towards the base. *Pedicels* glabrous, about 0·8 cm. long with 2 small ovate-lanceolate, pubescent bracteoles near the centre, 0·2–0·3 cm. long. *Calyx-tube* campanulate, glabrous, 1–1·3 cm. long, enlarging in fruit; lobes triangular, 1·2–1·8 cm. long, 0·5–0·7 cm. broad at the base, acute or subacute at the apex, mucronate, glabrous on both sides, ciliate on the margin. *Corolla* one-lipped, not splitting into lobes, 2·5–3·0 cm. long, about 1·5 cm. broad across the lip, glabrous without,

densely crisped-pubescent within at the base, stamens just exerted from the corolla when split. *Filaments* 1.3–1.8 cm. long, free in the lower half. *Anthers* about 1 cm. long, densely pubescent at the base and between the anther cells.—*Lobelia Gregoriana* Bak. fil. in Journ. Bot. **32**, 66 (1894) quoad inflorescentiam; folia *Senecionis Brassicae* R. E. Fr. et Th. Fr. jr.

Type specimen *Fries* 1303 in Herb. Upsala.

KENYA COLONY: Mt. Kenya; Western Slopes in the lower alpine region 10,800 ft., *Fries* 1303! 12,000–13,000 ft., *Lyne Watt* 1139! On moorlands 11,000 ft., *Rammell* 2669! 11,800 ft., in the "giant heath" zone, *Mearns* 1492!

17. *Lobelia sattimae* R. E. Fr. et Th. Fr. jr. in Svensk Bot. Tidsk. **16**, 414 (1922).

Plant with stem about 3–4 ft. high, crowned with a dense leafy rosette, and bearing an inflorescence about 6 ft. long. *Leaves* lanceolate, sessile, broadest below the middle, gradually narrowed to the subacute apex, 16–30 cm. long, 5–7 cm. broad, margin entire or obscurely crenulate towards the apex, sparsely ciliate or glabrous; under surface of leaf glabrous, upper surface long-matted-pubescent near the base, becoming glabrous towards the apex; midrib fleshy, lateral nerves ascending at an angle of about 30°. *Bracts* longer than the flowers, ovate, broadest below the middle, sessile at the base, long-acuminate at the apex, 6–9 cm. long, 3.5–5 cm. broad, margin entire or obscurely crenulate above, closely ciliate in the lower half, becoming glabrous towards the apex, shortly pubescent on both surfaces. *Pedicels* about 0.8 cm. long, glabrous, with 2 small triangular bracteoles towards the base about 0.3 cm. long. *Calyx-tube* campanulate, about 0.7 cm. long, pubescent to glabrescent; lobes triangular 1.2–1.7 cm. long, 0.4–0.5 cm. broad, pubescent on both sides, densely ciliate on the margin. *Corolla* deep purple, one-lipped, not splitting into lobes, 2.5–3 cm. long, and about 1.4 cm. across the lip when spread out, slightly pubescent without, densely crisped-pubescent within at the base, stamens just exerted from the corolla when split. *Filaments* about 2 cm. long or less, free in lowest third. *Anthers* about 1 cm. or more.

Type specimen *Fries* 2468 in Herb. Upsala.

KENYA COLONY: Aberdare Mts.: Mt. Sattima, alpine Region, 11,400 ft., *Fries* 2468! 12,500 ft., *Dale* 2864! Kinangop Mt., on grassy slopes above the forest limit, 10,000–12,700 ft., *Galpin* 7903! 11,000–13,000 ft., *Dale* 2682!

18. *Lobelia elgonensis* R. E. Fr. et Th. Fr. jr. in Svensk Bot. Tidsk. **16**, 411 tab. 7a (1922).

Leaves broadly lanceolate, entire, about 25 cm. long and 7 cm. broad, rounded at the apex, glabrous below, upper surface thickly pubescent in the lower third, glabrous in upper two-thirds; lateral nerves closely ascending at an angle of about 30°, slightly outcurved, conspicuous below, indistinct above. *Bracts* longer than the

flowers, ovate (smaller ones near the apex of the inflorescence ovate-lanceolate), broadest just above the middle, slightly narrowed to the sessile base, rather abruptly acuminate at the apex, about 8.5 cm. long and 4 cm. broad (acumen about 1 cm. long), glabrous on both sides, thinly ciliate on the margin, which is entire at the base and crenulate towards the top. *Pedicels* about 0.8 cm. long, glabrous, bearing 2 fleshy, ovate-lanceolate bracteoles about 0.4 cm. long. *Calyx-tube* campanulate, glabrous, lobes narrowly triangular, about 1.4 cm. long and 0.5 cm. broad at the base, acute at the apex, glabrous on both sides but ciliate on the margin. *Corolla* one-lipped, 2.5–3 cm. long, the lip about 1.5 cm. broad when spread out, thickly crisped-pubescent within, glabrescent without; stamens shorter than the split corolla. *Filaments* 1.5–2 cm. long, free in the lower half. *Anthers* about 0.8 cm. long.

Type specimen *Lindblom* s.n. in Herb. Holm.

UGANDA: Mt. Elgon; 13,000 ft., *Lindblom*. From just below Madangi to the foot of Jackson's Summit, about 13,000 ft., *Liebenberg* 1674! A higher swamp *Lobelia* from 13,000 ft. to the summit, *Tweedie* 111! 102!

19. ***Lobelia Telekii*** *Schweinf.* in von Höhnelt, Zum Rudolph-See und Stephanie-See 861, tab. 863 (1892).

Plant 2–6 ft. high, often leafless, with a long flower spike arising straight out of the ground; the non-flowering form is cabbage-like, consisting of a rosette of leaves about 9 ins. long. *Upper leaves* linear-lanceolate, sessile, gradually narrowed to the acute apex, 14–23 cm. long and 1.4–3 cm. broad, margin entire, shortly ciliate, upper and lower surfaces thinly puberulous, more densely so at the base; midrib prominent below, lateral nerves ascending at an angle of about 30°, anastomosing. *Basal leaves* linear-lanceolate, about 2 cm. long and 2.5 cm. broad at the base, gradually narrowed to the acute apex, margin entire, long-ciliate, under surface thinly pubescent more densely so towards the base and on the midrib, upper surface puberulous with long hairs at the base; lateral nerves ascending at an angle of about 30° from the midrib, anastomosing. *Bracts* at least 5 times as long as the flowers, linear, sessile at the base, gradually long-acuminate at the apex, 9–16 cm. long, 0.2–0.4 cm. broad, closely long-ciliate on the margin, thinly long-pubescent on the upper surface, subglabrous below. *Pedicels* about 0.5 cm. long, glabrous or thinly long-pubescent. *Calyx-tube* narrowly campanulate, from 0.4–0.8 cm. long, thinly to densely long-pubescent, lobes narrowly triangular, 0.8–1.3 cm. long and 0.1–0.2 cm. broad at the base, acute at the apex, long-ciliate on the margin, otherwise glabrescent. *Corolla* small, greenish-blue, pale mauve or dark purple, sometimes with white on the throat, 1.2–1.8 cm. long, pubescent without and bearing a long tuft of hairs at the apex, splitting half way down into 5 linear-lanceolate lobes, acute at the apex. *Filaments* about 1.2 cm. long, free at the base. *Anthers* about 0.5 cm. long. *Seeds* narrowly ovoid, about 0.6 mm. long,

margin not winged.—Bak. fil. in Journ. Bot. **32**, 68 (1894); Gard. Chron. Ser. III, **59**, 126 (1916) (Hab.); Fries in Svensk Bot. Tidsk. **16**, 415 and tabs. 1 and 8 a-c. *L. Fenniae* Th. Fr. in Bot. Notiser 1923, 296, tab. 1-2.

Type *Höhnelt*, W. Slopes of Mt. Kenya, Herb. Berlin.

UGANDA: Mt. Elgon; 13,800 ft., *Dummer* 3385! 13,500 ft., *Lugard* 435! 436! From below Madangi to foot of Jackson's Summit, *Liebenberg* 1617! Alpine grassland 12,600 ft., *Thomas* 629!

KENYA COLONY: Mt. Elgon; above the 13,000 ft. contour, *Honoré* 2519! 13,000 ft. and over in open country Mrs. D. R. *Tweedie* C.8! Mt. Kenya; lower alpine region about 10,700 ft., *Fries* 1255! 12,000-13,000 ft., *Lyne Watt* 1140! 11,000 ft., *Rammell* 2668! W. slopes, about 11,800 ft., *Mearns* 1467! 11,400-13,000 ft., *Gregory*! Aberdare Mountains; Alpine region, *Fries* 2415! Summit of Mt. Kinangop, 12,500-12,700 ft., *Galpin* 7903! 11,000-13,000 ft., *Dale* 2672! Mt. Sattima, 11,000-12,800 ft., *Dale* 2847!

20. *Lobelia Wollastonii* Bak. f. in Journ. Linn. Soc. **38**, 265 and tab. 19 (1908).

Plant 4-20 ft. high with an inflorescence up to 10 ft. long. *Leaves* narrowly oblong-lanceolate, sessile at the base, rounded to acute at the apex, with nearly parallel sides, 25-50 cm. long, 3-4.5 cm. broad, shining, coriaceous; glabrous on both surfaces except for the midrib, which is furnished with a few long fine hairs in the lower part; midrib fleshy, prominent, lateral nerves numerous, reticulate, spreading from the midrib at an angle of about 60°, impressed above, prominent below. *Bracts* drooping, up to twice as long as the flowers, linear to linear-lanceolate, broadest at or just above the base, gradually long-acuminate at the apex, about 6-8 cm. long, and 0.5 cm. broad at the base, both surfaces villous, margin densely so. *Pedicels* about 0.5 cm. long, villous. *Calyx-tube* campanulate, 0.4-0.6 cm. long, covered with long villous hairs; lobes linear, 1.5-2.3 cm. long, 0.3-0.5 cm. broad at the base, finely acuminate at the apex, covered on both sides and on the margin with long villous hairs. *Corolla* indigo to greenish blue, long-pubescent, splitting into 5 linear lobes; in bud 3-4 cm. long, 0.4-0.5 cm. broad, produced into a short point beyond the anthers. *Filaments* 2.8-3.5 cm. long, free at the base. *Anthers* 0.9-1 cm. long. *Seeds* broadly ovoid, about 0.6 mm. long, margin not winged.—Cortesi in Luigi Amadeo di Savoia, El Ruwenzori, Parte Scient. **1**, 445, tab. 44-46 (1909); Nat. Geogr. Mag. Washington **27**, 197 (1915) (Hab.). Fries in Svensk Bot. Tidsk. **16**, 416, tab. 8d (1922).

Type *Wollaston* in Brit. Mus.

UGANDA: East side of Mt. Ruwenzori; 12,000 ft. to the glaciers, *Dawe* 562! 12,500 ft. in swamps and on the sides of valleys, *Fishlock and Hancock* 80! *Humphreys* 550! Bujongolo 12,500-14,000 ft. *Godman*! 12,800-14,700 ft., *Humphreys*! 12,500-14,500 ft., *Wollaston*!

BELGIAN CONGO: Ruwenzori West; Butagu-Tal, 11,700–13,000 ft.; Virunga Mountains; Mt. Mikenno south slope of summit 12,000 ft., common in *Senecio* belt, *Burtt* 3066! Muhavura Mt., 12,000–13,500 ft., *Burtt* 2813! 12,500 ft., in profusion on N.E. slopes near summit, *Eggeling* 1006!

VI—OCHROCARPOS MADAGASCARIENSIS.

T. A. SPRAGUE.

The genus *Ochrocarpos* (*Guttiferae*) was described by Aubert du Petit Thouars in his *Genera Nova Madagascariensia*, 15 (1806) the generic name being attributed to Noronha. The description was as follows:—

“**Ochrocarpos** *Nor.* Calix diphyllus. Corolla. . . . Stamina numerosa, simplici ordine basi coalita; antherae ovatae. Ovarium oblongum; stylus subnullus; stigma planum, 4–5–6-lobum. Bacca corticosa, multilocularis secundum numerum loborum stigmatibus; loculi monospermi, aliquot abortientes. Semina carnosae, arillata, pseudo-monocotyledoneae; radícula in apice (sic in plerisque *Guttiferis*).—Arbor; folia verticillato-ternata, integerrima, coriacea; flores axillares; pedunculi pauciflori. *Οχρος* luteus, *Καρπος* fructus, a succo luteo abundans, praecipue in fructu.”

This description was reproduced verbatim in *Roem. Coll.* 207 (1809), and a French translation of it by Poiret appeared in *Dict. Sc. Nat.* 35, 332 (1825). A. P. De Candolle supplied a slightly modified generic description in *DC. Prodr.* 1, 560 (1824):—

“Calyx 2-sepalus. Stamina numerosa, in triplici ordine disposita, basi coalita. Stylus nullus. Stigma planum, sessile, peltatum, 4–6-lobum. Bacca olivaeformis, 4–6-locularis. Semina arillata, pseudomonocotyledoneae.—Arbor. Folia opposita, saepe approximata et quasi verticillato-ternata; flores axillares; pedunculi pauciflori.”

It will be observed that De Candolle, who had seen a specimen, described the stamens as triseriate (instead of uniseriate), the stigma as sessile and peltate, and the fruit as olive-shaped. He supplied the name of the species, *O. madagascariensis* Thou., erroneously citing this, however, from Thouars, *Gen. Nov. Madag.*, but gave no specific description.

Planchon and Triana (*Ann. Sc. Nat. ser 4*, 14, 364: 1860) supplied a specific diagnosis of *O. madagascariensis*, based on fragmentary material consisting of detached leaves and a piece of stem from herb. Du Petit-Thouars, which they accepted as the type:—“Foliis ternatis v. oppositis lineari-lanceolatis, acutiusculis, nervo medio valido, lateralibus crebris patentibus, venulis reticulatis.” Vesque in *DC. Monogr.* 8, 521 (1893) added nothing to our knowledge of the species.

A revision of the Madagascan species of *Ochrocarpos* was published by R. Viguier and H. Humbert in *Revue générale de Botanique* 25 bis, 630–636 (1914), 16 species being recognized. These authors

Plate VI



Ochrocarpus madagascariensis Thou. Reproduction of plate 26 in Thouars, Hist. Vég. Isles Austr. Afr. ed. 2 (1805).

included the following characters of *O. madagascariensis* in their key :—Leaves elongate-lanceolate, 12 cm. long, 2–2.5 cm. broad ; secondary nerves very close together, ending in a marginal nerve.

At the present day *O. madagascariensis* is perhaps the least known of the various species of *Ochrocarpos*, although it is the type of the generic name. It does not appear to have been rediscovered since the time of Thouars, and is not even mentioned in Nat. Pflanzenfam. ed. 2, 21, 192 (1925).

The fact that a fairly good plate with analyses of *Ochrocarpos madagascariensis* was published in 1805 by Thouars seems to have been entirely overlooked by all subsequent workers on the genus. This plate appeared in Thouars, Hist. Vég. Isles Austr. Afr. ed. 2, t. 26* (1805). This second edition of Thouars' work is not mentioned in Pritzels Thesaurus, ed. 2, 95, nn. 2521, 2522 (1872), where only the first edition (1804) and the third (1806) are included. As stated in the Catalogue of the Library of the British Museum (Nat. Hist.), there is a copy of it in the Library of the Kew Herbarium. The plate bears merely the generic name *Ochrocarpos*. The following description of the species (subsequently named *O. madagascariensis* DC.) has been drawn up from the plate.

Caulis angulatus, circiter 8 mm. diametro 15 cm. infra apicem. *Folia* ternatim verticillata, lanceolato-oblonga, apice obtusa vel subacuta, 12–15.5 cm. longa, 4.5–7 cm. lata, margine undulata, nervo medio valido subtus prominente ; nervi laterales principales utrinque circiter 16, patuli, paralleli, juxta medium folii circiter 1 cm. distantes, 3–4 mm. intra marginem arcuatim anastomosantes, nervis subsidiariis circiter 3 inter principales et eis parallelis in quaque areola interjectis ; petioli crassi, 1–1.5 cm. longi. *Cymae* axillares, 3-florae ; pedunculus circiter 2 cm. longus ; pedicelli 1 cm. longi. *Sepala* 2, sub fructu descendenti-reflexa, ovato-oblonga, vix 1 cm. longa. *Bacca* oblongo-ellipsoidea, oliviformis, cum stigmate 2 cm. longa, 0.8–1 cm. diametro. *Semina* leviter longitudinaliter curvata, vix 1 cm. longa.

It seems clear that the type of *Ochrocarpos madagascariensis* Thou., as well as that of the generic name *Ochrocarpos* Thou., was the specimen figured by Thouars in Hist. Vég. Isles Austr. Afr. ed. 2, t. 26 (1805). As this has apparently disappeared, Thouars' plate must be accepted as type. A reproduction ($\times \frac{3}{8}$) of it is now given (Plate VI), as the work in which it appeared is very rare.

The attached leaves and piece of stem in herb. Du Petit Thouars, which Planchon and Triana accepted as the type of *O. madagascariensis*, may or may not represent the same species. Planchon and Triana admitted that their adoption of this material as type was a little arbitrary :—" Nous prenons un peu arbitrairement cet exemplaire, réduits à quelques feuilles et à un fragment de rameau (anguleux, à épiderme jaunâtre), comme type de l'*Ochrocarpos*

*The roman numerals of the plate number at the top right hand corner of Pl. VI are unfortunately very faint, giving the impression that the number is xxii instead of xxvi.

madagascariensis de Du Petit Thouars." The leaves, as described by Planchon and Triana, and by Viguier and Humbert, are linear-lanceolate or elongate-lanceolate, 2-2.5 cm. broad, whereas those figured in Thouars' plate are lanceolate-oblong, 4.5-7 cm. broad.

The principal references to the generic name *Ochrocarpos*, and its type-species, *O. madagascariensis*, are given below.

Ochrocarpos *Thou.* Hist. Vég. Isles Austr. Afr. ed. 2, t. 26, cum anal. (1805); Gen. Nov. Madag. 15 (1806); DC. in DC. Prodr. 1, 560 (1824). *Ochrocarpus*, Juss. Dict. 20, 104 (1821); Planch. et Triana in Ann. Sc. Nat. ser. 4, 14, 364 (1860); Vesque in DC. Monogr. Phan. 8, 519 (1893); Viguier et Humbert in Rev. Gén. Bot. 25 bis, 630 (1914); Engl. in Engl. et Prantl, Nat. Pflanzenfam. ed. 2, 21, 192 (1925).

O. madagascariensis DC. in DC. Prodr. 1, 560 (1824); Planch. et Triana, l.c.; Vesque, l.c. 521; Viguier et Humbert, l.c. 632—*Ochrocarpos* *Thou.* Hist. Vég. Isles Austr. Afr. ed. 2, t. 26, cum anal. (1805).

MADAGASCAR. Without locality, *Thouars*.

Thouars' plate of *Ochrocarpos* was mentioned in a bibliographical note by Hiern (Journ. Bot. 1900, 493), who identified it as "apparently *Ochrocarpos Goudotianus* Planch. et Triana." *O. Goudotianus*, however, differs in the shape of the leaves, which are narrowly obovate or oblanceolate, rounded or emarginate at the apex, cuneate into the base, and in the longer petioles (2-3 cm. long). It is represented in the British Museum Herbarium by two sheets from Madagascar (Tamatave *Hilsenberg*; sine loc., *J. V. Thompson*), both named *Ochrocarpos madagascariensis*.

In accordance with Art. 57 of the International Rules of Botanical Nomenclature, ed. 2, the original spelling *Ochrocarpos* must be retained, the latinized form *Ochrocarpus* being rejected. Botanists are recommended, when proposing new names, to adopt latinized endings, but they must not alter the spelling of validly published names, unless it can be shown that there was a typographical error or unintentional orthographic error in the original place of publication.

VII—PLANTS NEW TO ASSAM: VI.* C. E. C. FISCHER.

The previously known distribution of each plant is given between its name and its distribution in Assam.

Deutzia purpurascens *Rehd.* [Saxifragaceae].

W. China.

Delei Valley, 28° 21' N., 96° 37' E., 9000-10,000 ft., fls. pale-pink, June, *Kingdon Ward* 8323: "A long-limbed bushy shrub growing in shady gullies in the *Tsuga-Rhododendron* forest." A colour form.

*Continued from *K.B.* 1932, 349.

Saxifraga brachypoda Don [Saxifragaceae].

Kumaon to Bhutan.

Delei Valley, 28° 15' N., 96° 40' E., 12,000–13,000 ft., fls. golden-yellow, Oct., *Kingdon Ward* 8683: "On rocks on open alpine slopes."

Saxifraga diversifolia Wall. [Saxifragaceae].

Kashmir to Bhutan and W. China.

Delei Valley, 28° 15' N., 96° 35' E., 11,000–12,000 ft., fls. bright yellow, almost orange, Sept.–Oct., *Kingdon Ward* 8621: "Stem, leaves and inflorescence covered with crimson glandular hairs; on earth-screes amongst scrub Rhododendron"; *Kingdon Ward* 8676: "Leaves hard and brittle, fls. orange, on rocks and cliffs within the forest belt"; *Kingdon Ward* 8684: "Flowers bright-yellow closely spotted with ochre, on open alpine slopes in clumps."

Saxifraga hispidula Don var. **Doniana** Engl. [Saxifragaceae].

S. Tibet.

Delei Valley, 11,000–12,000 ft., fls. bright-yellow, Sept., *Kingdon Ward* 8670: "In clumps on ledges of cliffs in a steep narrow gully."

Saxifraga sarmentosa Linn. [Saxifragaceae].

W. China to Japan.

Delei Valley, 28° 21' N., 96° 37' E., 6000–7000 ft., fls. April, *Kingdon Ward* 8137: "On shaded wet cliffs."

Bergenia purpurascens (Hook. f. et T.) Engl. [Saxifragaceae].

Sikkim.

Delei Valley, 28° 21' N., 96° 37' E., 13,000 ft., fls. June, *Kingdon Ward*, 8333: "In colonies or scattered on slopes covered with dwarf Rhododendron, along the ridge."

Sanicula hacquetioides Franch. [Umbelliferae].

Yunnan.

Delei Valley, 11,000–13,000 ft., fls. white or mauve, June, *Kingdon Ward* 8357: "On earth slopes in gullies. Abundant in the alpine region on S. slopes from which the snow has just gone—almost the only plant yet in flower."

Schefflera shweliensis W. W. Smith [Araliaceae].

Yunnan.

Manipur: ascent to Seriphai, frt. Jan., *G. Watt* 5974; Sirohifur, 6000 ft., frt. April, *G. Watt* 6462, 6469. Naga Hills: Japoo, 7000–8000 ft., frt. May, *Kingdon Ward* 7718: "40 ft. high, common in the upper temperate or oak forest, fruit black"; Delei Valley, 6000–8000 ft., fls. green, fragrant, Sept., *Kingdon Ward* 8172, 8652: "Medium sized or small repeatedly branched tree having the appearance of a clump of palms, common in the lower rain forest, chiefly in open places along the ridges or in clearings."

Hoeckia Aschersoniana Engl. et Graebn. [Valerianaceae].

W. China.

Delei Valley, 28° 15' N., 96° 35' E., 8000–10,000 ft., fls. white, Aug., *Kingdon Ward* 8590: "In open gullies on the N. face or under trees on the S. face of the ridge."

Patrinia speciosa *Hand.-Mazz.* [Valerianaceae].

S.E. Tibet and Yunnan.

Delei Valley, 28° 21' N., 96° 37' E., 12,000 ft., fls. bright-yellow, fragrant, July, *Kingdon Ward* 8429: "On alpine turf slopes and earth slides or amongst shrubs."

Dipsacus inermis *Wall.* [Dipsacaceae].

Kashmir to Bhutan in the Himalayas.

Delei Valley, 28° 15–20' N., 96° 35' E., 5000–9000 ft., fls. cream with dark-purple anthers, fragrant, Aug.-Oct., *Kingdon Ward* 8529, 8691: "On open grassy slopes along the ridge, S. face."

Morina betonicoides *Benth.* [Dipsacaceae].

The Sikkim Himalayas.

Delei Valley: Kaso, 13,000–14,000 ft., fls. purplish-crimson, July, *Kingdon Ward* 8412: "On the rocky ridge and on turfey ledges of cliffs, S. aspect."

Blainvillea rhomboidea *Cass.* [Compositae].

The upper Gangetic Plain westwards (see Fl. Brit. Ind.).

N. Cachar Hills at Haflong, 2500 ft., fls. Aug., *Craib* without number.

Cremanthodium rhodocephalum *Diels* [Compositae].

Yunnan.

Delei Valley, 28° 15' N., 96° 35' E., 11,000–12,000 ft., fls. nodding, pale pinkish-purple, Sept., *Kingdon Ward* 8622: "Leaves purple, on bare-looking earth slopes in very steep gullies."

Cremanthodium Thomsoni *C. B. Clarke* [Compositae].

Sikkim.

Delei Valley: Kaso, 13,000 ft., fls. nodding, ray bright-yellow, disc purple, July, *Kingdon Ward* 8439: "On alpine meadow slopes, facing S."

Prenanthes yakoensis *Jeffr.* [Compositae].

Yunnan.

Delei Valley, 28° 15' N., 96° 35' E., 4000–6000 ft., fls. dark wine-purple, Oct., *Kingdon Ward* 8694: "A scrambling plant common in thickets along the open-wooded ridge and on the edge of the forest."

Androsace Gagnepainiana *Hand.-Mazz.* [Primulaceae].

Yunnan.

Delei Valley, 28° 21' N., 96° 37' E., 12,000 ft., fls. white with a green eye, June, *Kingdon Ward* 8286: "On the lee side of a granite outcrop, N. facing slope below ridge."

Omphalogramma Forrestii Balf. f. [Primulaceae].

Yunnan.

Delei Valley, 28° 21' N., 96° 37' E., 10,000–11,000 ft., fls. bright-violet, throat cream within, May, *Kingdon Ward* 8234 : " On steep muddy slopes under bamboos, singly or in clumps, only on the ridge where the soil is more or less water-logged as in peaty hollows ; scape pubescent, hairs mostly white, sometimes crimson, calyx-lobes green or dull-crimson."

Hoya Lobbii Hook. f. [Asclepiadaceae].

The fruit of this species appears not to have been described. It has been received from Sugiri in the Garo Hills, *Mrs. N. E. Parry* 1307, in fruit in Feb., from which specimen the following description has been made : *Follicle* pendent, bluntly acuminate, 13.7 cm. long, 5 mm. diam., brownish, quite glabrous. *Seeds* (not quite ripe) linear, flattened, apex truncate, base bluntly attenuate, 2.5–3 mm. long, *coma* up to 4 cm. long, cream or pale-brown.

Hoya polyneura Hook. f. [Asclepiadaceae].

The Sikkim Himalayas.

Delei Valley, 28° 20' N., 96° 37' E., 6000 ft., frt. April-May, *Kingdon Ward* 8139.

Brandisia rosea W. W. Smith var. **flava** C. E. C. Fischer, var. nov. [Scrophulariaceae] ; corolla flava a typo speciei distincta.

W. China and E. Tibet.

Delei Valley, 28° 15' N., 96° 35' E., fls. pale-yellow, Oct., *Kingdon Ward* 8699 : " A scraggy bushy shrub growing on rocks along the open ridge."

Griffith's specimen [*Kew Dist.* 3748] from Bhutan, referred to in the Gen. Pl. and in the Fl. Brit. Ind., and a sheet collected by Nuttall also in Bhutan (both in the Kew Herb.) are this species, but being in fruit only it cannot be determined whether they represent the typical species or the colour variety.

Lindenbergia Hookeri C. B. Clarke ex Hook. f. [Scrophulariaceae].

Sikkim.

Lohit Valley Road : Denning, 28° 0' N., 96° 15' E., 2200 ft., fls. March, *Kingdon Ward* 7901 : " A loose bushy shrub with long arching branches flopping over. Fls. numerous, not very showy, lower lip of corolla bright-yellow, upper dull, with a brown flush. In shady places along jungle paths and on sheltered grassy banks in the open. Occurs all up the Lohit as far as the Delei Valley at least."

Pedicularis Gammieana Prain [Scrophulariaceae].

Sikkim.

Delei Valley, 28° 21' N., 96° 37' E., 12,000 ft., fls. purple, July, *Kingdon Ward* 8397 : " Open places, cliffs and turf slopes along the ridge."

Pedicularis gibbera Prain [Scrophulariaceae].

Sikkim.

Delei Valley, 28° 15' N., 96° 35' E., 11,000–12,000 ft., fls. purple, Aug., *Kingdon Ward* 8603: "On earth and rubble screes amongst scrub *Rhododendrons*."

***Pedicularis gracilis* Wall.** [Scrophulariaceae].

Kashmir to Sikkim.

Delei Valley, 28° 15' N., 96° 35' E., 9000 ft., fls. purple, Sept., *Kingdon Ward* 8637: "On rocky outcrops in natural clearings amongst the scrub forest clothing the steep S. face of the ridge."

***Pedicularis Pantlingii* Prain** [Scrophulariaceae].

Sikkim, E. Nepal and Chumbi.

Delei Valley, 28° 21' N., 96° 37' E., 11,000–12,000 ft., fls. purplish-pink, July, *Kingdon Ward* 8398: "Along the ridge under bamboos on grass slopes."

VIII—LILIUM, NOTHOLIRION AND FRITILLARIA.

The short paper which follows embodies the substance of a letter written some time ago by the late Dr. O. Stapf, F.R.S., to a private correspondent. A slight modification in the nomenclature has been introduced in order to conform with the decisions of the International Botanical Congress held at Cambridge in 1930: the authority cited for the combination *Notholirion macrophyllum* being "(D. Don) Boiss." instead of merely "Boiss." The citation of the name D. Don in brackets indicates that the specific epithet *macrophyllum* goes back to D. Don, who originally described the species under the name *Fritillaria macrophylla*. It also indicates that the type of the species is the specimen described by D. Don. Hence, if this method of citation is adopted, no confusion can arise from the fact that Boissier, when he transferred *Fritillaria macrophylla* to *Notholirion*, included another species under the name *Notholirion macrophyllum*, and gave a description based on that second species. T. A. S.

The diagnostic characters used by Linnaeus for distinguishing *Lilium* and *Fritillaria* are these:—

LILIUM.	FRITILLARIA.
<i>Corolla</i> e basi angusta campanulata	campanulata, basi patens (<i>i.e.</i> gibbosa)
<i>Petala</i> erecta, sensim patentiora, apicibus reflexis	parallela
<i>Nectarium</i> linea longitudinalis insculpta	fovea excavata
<i>Antherae</i> incumbentes (<i>i.e.</i> , versatiles)	erectae
<i>Stigma</i> triangulare	triplex, patens
<i>Germen</i> cylindraceum	trigonum

These characters still hold good in most cases; but in the course of time plants became known which combined characters supposed

to be peculiar to one or the other of the two genera. They were therefore referred by some botanists to *Lilium*, by others to *Fritillaria* (placed under *Fritillaria* by D. Don, 1825, 1840 ; Kunth, 1843 ; Baker, 1874, 1878 ; and under *Lilium* by Wallich, 1831-32 ; Lindley, 1845 ; W. J. Hooker, 1853 ; Baker, 1871 ; Duchartre, 1872 ; Engler, 1888 ; J. D. Hooker, 1892 ; E. H. Wilson, 1925 ; and K. Krause, 1930). From a note in Voigt, Hort. Calcutt. (1845) and from a letter by Wallich to Sir W. J. Hooker (1853), it appears that Wallich at some time gave this group a distinctive generic name *Notholirion*, with *N. roseum* as the only species, without, however, publishing it ; nor did Voigt more than record this fact. Subsequently, Wallich's concept of the group was taken up by Baker with the rank of a subgenus or section, and maintained by all later writers except Boissier (1882), who accorded it the status of a genus, mainly on account of the very peculiar structure of the bulb, which is unique in *Lilium* (sensu lato) and had been studied and explained by Duchartre in an excellent paper (1872). It is to this group that *Lilium Thomsonianum*, *L. roseum*, and *Fritillaria macrophylla* belong, and I do not hesitate to say that Boissier was right. The three genera may be diagnosed thus :—

LILIUM (excl. <i>Notholirion</i> and <i>Cardiocrinum</i>)	FRITILLARIA (excl. <i>Rhizolirion</i>)	NOTHOLIRION
<i>Mature bulb</i> of many fleshy imbricate, ovate to lanceolate store-scales without scarious or membranaceous outer coats (leaf-bases)	usually small, of 1, 2, or more (never many) free or more or less fused depressed store-scales without outer coats (leaf-bases)	of a varying number of fleshy ovate to lanceolate store-scales surrounded by scarious or membranous outer coats (old leaf-bases)
<i>Perigone</i> funnel-shaped to campanulate or campanulate-rotate	campanulate	campanulate
<i>Tepals</i> more or less diverging with recurved tips, to revolute	subparallel or diverging, but then tips not recurved	obliquely erect with more or less recurved tips
<i>Nectary</i> a narrow linear longitudinal groove	an oblong to circular pit	none or a basal circular pit
<i>Anthers</i> versatile	erect	versatile

The area of *Notholirion* extends from Kansu and Shensi to Yunnan and through the Himalaya to Afghanistan. The genus comprises a small number of closely allied species with a much confused nomenclature.

(1) ***Notholirion macrophyllum* (D. Don) Boiss.** Fl. Or. **5**, 190 (1882), quoad syn. *Fritillaria macrophylla*.

Fritillaria macrophylla D. Don, Prodr. Fl. Nepal. **51** (1825).

Lilium roseum Wall. Cat. **5077/A** (1831-32), nomen, et in Herb. ; Hook. f. Fl. Brit. Ind. **6**, **352** (1892), partim.

Lilium Hookeri Baker in Gard. Chron. **1871**, **201**.

Fritillaria Hookeri Baker in Journ. Linn. Soc., Bot. **14**, **269** (1874).

(2) ***Notholirion Thomsonianum* (Royle) Stapf**, comb. nov.

Lilium roseum Wall. Cat. **5077/B** (1831-32), nomen, et in Herb.

Lilium Thomsonianum Royle, Ill. t. 92 (1839).

Lilium (No. 87) Griff. Itin. Not. 345 (1848); *L. longifolium* Griff.

Notul. 3, 241 (1851); Ic. Pl. Asiat. t. 277 (1851).

Fritillaria Thomsoniana D. Don apud Royle, l.c. 388 (1840).

Notholirion macrophyllum Boiss. Fl. Or. 5, 190 (1882), quoad descr.
et synon. nonnull., non *Fritillaria macrophylla* D. Don.

(3) **Notholirion hyacinthinum** (*E. H. Wils.*) Stapf, comb. nov.
Fritillaria Hookeri Baker in Bot. Mag. t. 6385 (1878), non Baker
(1871).

Lilium Thomsonianum Franchet in Journ. de Bot. 6, 320 (1892), non
Royle (1839).

Lilium roseum C. H. Wright in Journ. Linn. Soc., Bot. 36, 133 (1903),
partim, non Wall.

Lilium sp. Farrer in Gard. Chron. ser. 3, 67, 6, fig. 4 (1920).

Lilium hyacinthinum E. H. Wilson, Lil. East. Asia, 100 (1925).

This last species may be found to have been taken in too wide a
sense, the Szechuan and Kansu specimens having small flowers.

IX—MISCELLANEOUS NOTES.

DUKINFIELD HENRY SCOTT.—We have to record with deep
regret the death on January 29th of Dr. D. H. Scott, F.R.S. An
appreciation of Dr. Scott's work will appear in the next number of
the Bulletin.

MR. D. STEVENSON.—Mr. D. Stevenson, who was formerly
Senior Assistant Conservator of Forests, Northern Rhodesia, and
who has recently been employed temporarily in the Herbarium for
work on Asiatic and West African plants, has been appointed
Assistant Conservator of Forests, Gold Coast.

Flora of Tropical Africa.—Vol. 9, part 6, of this work was
published on Jan. 1st, 1934. This part, together with part 5,
published on Aug. 12th, 1930, contains an account of the family
Gramineae, as far as the end of the tribe *Paniceae*, by the late Dr. O.
Stapf and Mr. C. E. Hubbard.

Corrigendum.—The words "sp. nov." occurring after the
name "*Semecarpus lanceolatus* Ridley" in K.B. 1933, 491, should
be deleted, that species having been previously published in K.B.
1933, 199.

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